

# THE LARYNGOSCOPE.

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## ORIGINAL COMMUNICATIONS.

(Original communications are received with the understanding  
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### MANUEL GARCIA.

**Invented the Laryngoscope, 1855.**

**Celebrates His 100th Birthday, March 17th, 1905.**

Manuel Garcia was born at Madrid on the 17th of March, 1805,—exactly 100 years ago. We may realize what this means by the fact that as a child he had to leave his native Spain owing to the advance of the Duke of Wellington's army in the Peninsular War. Indeed, it is said that as a lad he was an onlooker at the Battle of Talavera.

At the age of 15 he received instruction in Harmony from Fétis and in singing from his father. It is nearly 80 years since he accompanied his father and his sister, the celebrated prima donna, Madame Malibran, to New York to introduce Rossini's "Barber of Seville." At that time New York was a comparatively small town of about 160,000 inhabitants—less than one-twentieth of its present population—and the Puritan element was still so strong that Saturday evening opera performances had to be abandoned because the New Yorkers would not go to a theatre on the eve of the Sabbath.

We find Señor Garcia in Paris once more in 1829, when he quitted the stage and devoted himself to teaching music. A little later he undertook a serious scientific enquiry into the conformation of the

vocal organs, limits of registers and the mechanism of singing. The results were: (1) his invention of the laryngoscope, and (2) his "Mémoire sur la voix Humaine" presented to the French Institut in 1840, which obtained for him the congratulations of the Academy and may be said to be the foundation of all subsequent investigations into the voice. Appointed Professor of Singing at the Conservatoire he published in 1847 his "Traité complet de l'art du chant, en deux parties," which has been translated into Italian, German and English and has gained a world-wide reputation. Among his pupils may be mentioned Jenny Lind, Catherine Hayes and Henriette Nissen (afterwards Madame Saloman) M. Bataille, and his sister Madame Viardot.

In 1850 Señor Garcia resigned his position at the Conservatoire and came to London, where he was appointed a Professor at the Royal Academy of Music, and was long one of the leading teachers of singing in London. Amongst his other publications are, *Ecole de Chant*, 1840; *Hints on Singing*; and a pamphlet on the Physiology of the Voice. He is a Chevalier de l'Ordre de Mérite, a correspondent of the University of Stockholm, and the Königsberg University has elected him a Doctor of Medicine, *honoris causa*. He is an Honorary Member of the Laryngological Society of London and an Honorary Fellow of the American Laryngological Association.

His discovery of the laryngoscope and his original communication to the Royal Society are dealt with elsewhere in this number. A mere record of Señor Garcia's life and publications would fail to give any suggestion of the culture, charm and vitality of this Grand Old Man of Music. In addition to his native Spanish he speaks fluent French and English, and has a good acquaintance with German. He is in the enjoyment of all his faculties, possessed of excellent sight and hearing, and with a keen zest in life. For many years he has been an honoured guest at the annual dinner of the Laryngological Society of London, where he has appreciated the sociability of the evening and not infrequently made a bright and racy speech, seldom starting for his suburban home some four miles off; until after 10 o'clock. It has always been difficult for anyone meeting

him for the first time at these réunions to believe that he was very nearly a centenarian.

The universality of science and art is well shown in this centenary, where a Spaniard, resident in London, is presented with his portrait painted by an American, and subscribed for by laryngological and musical societies from all over the world.

Pioneers and discoverers in former years were persecuted; in later times they were simply ignored and their inventions neglected. Señor Garcia has the satisfaction of having lived to see the jubilee of his discovery—a discovery which has created a complete specialty, has added extensively to the science of medicine, and has given help and healing to countless thousands.

On our side we have the delight of being able to acknowledge our indebtedness to this hale and hearty centenarian and of seeing him surrounded by all

“That which should accompany old age,  
As honour, love, obedience, troops of friends.”

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#### THE GARCIA CENTENARY, AND THE JUBILEE OF LARYNGOSCOPY.

It is a curious and interesting fact that these two celebrations should be contemporaneous. On the 17th of March, Señor Manuel Garcia celebrates his 100th birthday. It was in the year 1855 that he presented to the Royal Society his paper demonstrating the possibility of seeing the larynx in the living subject; and in the present year therefore laryngoscopy celebrates its jubilee.

The arrangements for the celebration of the 17th of March are complete and promise a most successful festival. In the house of the Laryngological Society that morning Señor Garcia will receive addresses from the Spanish Ambassador, the Royal Society, the Prussian Academy of Sciences, and the Koenigsberg University, from musical bodies (Royal Academy of Music, the Royal College of Music, etc.), from his old pupils and from various laryngological

societies. Although addresses will be sent from America it is doubtful whether there will be any delegates to present them in person. The Berlin Laryngological Society will be represented by Professor Glück, Dr. Landgraf and Dr. Kuttner. The delegates of the South German Laryngological Society are Professor Jurasz of Heidelberg, and Dr. Avellis of Frankfort-on-Maine. The Société Française de Laryngologie will be represented by Dr. Moure of Bordeaux, Dr. Lermoyez of Paris, and Dr. Texier of Nantes. Dr. Moll of Arnheim represents the Dutch Laryngological Society, and Dr. Delsaux of Brussels is the delegate of the Belgian. The Rhenish Society is sending Dr. Hansberg and Dr. Hirschland. The American Laryngological Association is sending an address to its Honorary Fellow, and greetings will also be sent by the American Laryngological, Rhinological and Otological Society, the American Academy of Ophthalmology and Oto-Laryngology, and the Section on Laryngology of the New York Academy of Medicine.

• After these addresses Señor Garcia will be presented with his portrait. This, as we have already announced, has been subscribed for by laryngologists and musicians from all over the world. It is painted by Mr. John Sargent. We need hardly remind our readers that Mr. Sargent is the son of a Boston physician; that he was born in Florence; that he is a Royal Academician; and that he is one of the most celebrated portrait painters of the time in any country. We are assured that the portrait is a *chef-d'oeuvre* and many readers will doubtless be anxious to secure engravings of it. There will be a limited number of artist's proofs, signed by both the painter and the centenarian sitter. Needless to say that early application should be made for these.

On the afternoon of the same day a special sitting will be held at the Laryngological Society when its members will show their foreign visitors interesting cases and results.

The "Festa" will close with a banquet at the Hotel Cecil in the evening, the music being supplied by the former pupils of the centenarian *Maestro*—the guest of the evening.

STCLAIR THOMSON, M.D.

## THE HISTORY OF THE LARYNGOSCOPE.

BY ST CLAIR THOMSON, M.D., F.R.C.P., F.R.C.S.

Physician for Diseases of the Throat in King's College Hospital; formerly Physician to the Throat Hospital, Golden Square, and Surgeon to the Royal Ear Hospital. Corresponding Fellow of the American Laryngological Association, and of the Société Française de Laryngologie.

At one of the gatherings of the Laryngological Society of London it was well said by the late Sir George Johnson that the history of the beginning of our specialty was, happily, an undisputed one; and that unless a laryngoscope were dug up at Pompeii, or found depicted in an Egyptian tomb, we could rest contented in agreeing that laryngology originated in 1855 and owed its creation to the discovery of Señor Garcia.

But though that art was long awaiting the fitting instrument, the science of rhinology and laryngology had been slowly growing for hundreds and thousands of years. Rhinology goes back in history to 3500 B.C., when—as Dr. Jonathan Wright\* informs us—Sekhet'enanch the medical attendant of King Sahura treated this monarch, and “made his nostrils well.” In the learned pages of Dr. Wright we can trace the early evolution in rhino-laryngology onward through the landmarks left by Hippocrates, Celsus, Galen, the middle ages, the renaissance, the reformation, and the French revolution.

In the pre-laryngoscopic days of last century Bayle had studied cedema of the glottis (1819); Bretonneau's classical work on diphtheria had appeared (1826); Trousseau and Belloc had won the prizes of the Paris Academy of Medicine for their work on laryngeal phthisis (1837); Ludwig had given his name to a form of phlegmonous sore throat†; and Horace Green had been bitterly attacked because he claimed that he could introduce instruments and medications into the larynx.

Tracheotomy had been performed before the Christian era. Thyrotomy had been carried out with success by Brauers, of Louvain (1834). In 1827, Dr. Physick, of Philadelphia, invented, for the removal of enlarged tonsils, an instrument which is practically identical with the guillotine so frequently called after Fahnstock or Mackenzie. The knowledge of rhinology—as already pointed out—was of still older date. Hippocrates and Galen were far from being ignorant of affections of the nose, or unsuccessful in the treat-

\* The Nose and Throat in Medical History. By Jonathan Wright, M.D. “The Laryngoscope.”

† *Medicinishe Correspondenz Blatt des Würtemb. Aerzte. Verein.* Bd. VI., No. 4. Feb. 5, 1836, p. 24.

ment of them; Schneider revolutionized the older views as to its being the cloaca of the brain (1660); Highmore had given his name to one of the accessory cavities (1651), and this same cavity had been drained by Cowper by an opening through a tooth-socket from the alveolar border (1698), while Desault had opened it from the canine fossa (1790).

"In the unreasoned progress of the world,"—as Wordsworth puts it,—further developments were hindered by our inability to see the living larynx. Before Columbus landed in America, doubtless many a mariner had been wrecked upon its coasts; and before Manuel Garcia had easily sighted the living vocal cords, more than one ardent explorer had caught a glimpse of them.

At the beginning of last century a certain Dr. Bozzini, of Frankfort-on-the-Maine, designed an instrument for illuminating "the internal cavities and spaces in the living animal body." It was really a curved speculum, and although it was much too clumsy ever to be of any practical service, still its inventor recognized the necessity of the two principles which are met with in the laryngoscope of the present day; these are, the reflection of light and the reception in a mirror of the image of the region hidden from direct inspection. Bozzini effected this by arranging two mirrors in the angle of his laryngeal speculum, one being intended to convey the light, the other to receive the image. We know that this arrangement is unnecessary, and that the one mirror can serve both for reflecting the light and for receiving the image of the parts which are thus illuminated. This was recognized twenty-two years afterwards, namely, in 1829, when Dr. Benjamin Guy Babington showed his "glottiscope" to the Hunterian Society of London, for he used a single laryngeal mirror, very similar to those used at the present day, and on this he concentrated the sun's rays by means of a common hand looking-glass. There are no cases recorded in which Babington's laryngoscope was employed, although he used it on many patients, and a method which depended on so uncertain a luminary as the sun—at least in this climate—could not be expected to secure any general adoption. Another distinct objection was that it demanded the use of the operator's two hands; the right one holding the laryngeal mirror, while the left manipulated the hand-glass.

Attempts were made by Liston, in 1840, when treating œdematous tumours which obstruct the larynx, to obtain a deeper view "by means of such a glass as is used by dentists on a long stalk, previously dipped in hot water, introduced with its reflecting surface downwards, and carried well into the fauces." In 1844, Warden tried to inspect the interior of the larynx by means of prisms, but was so

unsuccessful that he was forced to the conclusion that his method would give no assistance in the investigation of disease below the pharynx. About the same time, Avery, of London, was attempting to see the vocal cords by an arrangement of which the principles were sound, although the construction was too cumbersome to be practical. Like Bozzini he employed artificial light, and he made use of a frontal mirror, but instead of using it to reflect light from some distance, the mirror only served to increase the luminous power of a candle held at a short distance from the patient's mouth. The laryngeal mirror was not mounted on a shank, but was fixed in a speculum—as in Bozzini's invention.

Last century had more than half run its course before laryngoscopy became a practical art. Señor Manuel Garcia was then teaching singing in Paris, and,—doubtless like many before him,—was most anxious to perfect his anatomical and physiological studies of the throat by seeing "a healthy glottis exposed in the very act of singing." How his wish became realized is thus described in his own words: "One September day, in 1854, I was strolling in the Palais Royal, preoccupied with the ever-recurring wish so often repressed as unrealizable, when suddenly I saw the two mirrors of the laryngoscope in their respective positions, as if actually present before my eyes. I went straight to Charrière, the surgical-instrument maker, and asking if he happened to possess a small mirror with a long handle, was informed that he had a little dentist's mirror, which had been one of the failures of the London Exhibition of 1851. I bought it for 6 francs. Having obtained also a hand mirror, I returned home at once, very impatient to begin my experiments. I placed against the uvula the little mirror (which I had heated in warm water and carefully dried); then, flashing upon its surface with the hand mirror a ray of sunlight, I saw at once, to my great joy, the glottis wide open before me, and so fully exposed, that I could perceive a portion of the trachea. When my excitement had somewhat subsided, I began to examine what was passing before my eyes. The manner in which the glottis silently opened and shut, and moved in the act of phonation, filled me with wonder."\*

In the following year, Garcia presented a paper to the Royal Society of London entitled *Physiological Observations on the Human Voice*, and laryngoscopy therefore dates from 1855 and now fitly celebrates its jubilee along with the centenary of its inventor.

Garcia's investigations were all carried out on himself, and in his autoscopic examination he employed two mirrors—a small one at

\* Transactions of the Seventeenth International Medical Congress, London, 1881. Vol. III., p. 197.

the end of a long stem for introducing into the pharynx, and a large one, which served both for directing the light on to the smaller mirror, and for enabling the operator to see the image formed on it. This method had been independently imagined by Garcia, but it will at once be recognized that it is precisely similar to the one employed by Babington twenty-two years previously; the latter, however, never examined his own larynx, while Garcia's observations were made on himself. As far as England was concerned, Garcia's discovery shared the same fate as Babington's; it was treated with apathy, and even with incredulity. His paper, however, fell into the hands of Dr. Türck, of Vienna, who, after some experiments, appears to have thrown the mirrors aside as useless, and to have formed the conclusion that "he was far from entertaining too sanguine hopes about the employment of the laryngeal mirror in practice." In the same year the mirrors were borrowed by Dr. Czermak, of Buda-Pesth, and he was quick to see what was wanting to complete an invention which he recognized at once as being of the greatest promise. Czermak substituted artificial light for the uncertain rays of the sun; the light was reflected and concentrated by a large ophthalmoscopic mirror; laryngeal mirrors were constructed of different sizes; and finally, the art of medical laryngoscopy was perfected, and presented to the world in an article in the *Wiener medizinische Wochenschrift* on March 27th, 1858. The question of priority of this invention need not detain us. The difficulty of deciding it induced the French Academy of Science, in 1860, to divide the Prix Monthyon between the two candidates, Türck and Czermak. It is sufficient to recognize that the possibility of viewing the interior of the larynx was certainly demonstrated by Babington in 1829, but he failed to conceive the future of his invention. The successful attempt to view the vocal cords was independently carried out by Garcia in 1854, and made public in 1855. An effort to apply the discovery to medical use was made by Türck in 1857; but the perfecting of the technique, and the realization of its possibilities, must be attributed to Czermak. Indeed, in one of his earliest communications on the subject, he insisted on the fact that the invention was not only of the greatest service in diagnosis, but also in treatment. He was the first to demonstrate its use in posterior rhinoscopy, and in 1863 he detected, with the mirror, in the post-nasal space the "growths like a cock's comb," which, five years later, were fully discovered by Meyer, of Copenhagen, and described as adenoid vegetations.

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## "OBSERVATIONS ON THE HUMAN VOICE."\*

BY MANUEL GARCIA.

The pages which follow are intended to describe some observations made on the interior of the larynx during the act of singing. The method which I have adopted is very simple. It consists in placing a little mirror, fixed on a long handle suitably bent, in the throat of the person experimented on against the soft palate and uvula. The party ought to turn himself towards the sun, so that the luminous rays falling on the little mirror, may be reflected on the larynx. If the observer experiment on himself, he ought, by means of a second mirror, to receive the rays of the sun, and direct them on the mirror, which is placed against the uvula. We shall now add our deductions from the observations which the image reflected by the mirror has afforded us.

### OPENING OF THE GLOTTIS.

At the moment when the person draws a deep breath, the epiglottis being raised, we are able to see the following series of movements:—the arytenoid cartilages become separated by a very free lateral movement; the superior ligaments are placed against the ventricles; the inferior ligaments are also drawn back, though in a less degree, into the same cavities; and the glottis, large and wide open, is exhibited so as to show in part the rings of the trachea. But unfortunately, however dexterous we may be in disposing these organs, and even when we are most successful, at least the third part of the anterior of the glottis remains concealed by the epiglottis.

### MOVEMENT OF THE GLOTTIS.

As soon as we prepare to produce a sound, the arytenoid cartilages approach each other, and press together by their interior surfaces, and by the anterior apophyses, without leaving any space, or intercartilaginous glottis; sometimes even they come in contact so closely as to cross each other by the tubercles of Santorini. To this movement of the anterior apophyses, that of the ligaments of the glottis corresponds, which detach themselves from the ventricles, come in contact with different degrees of energy, and show themselves at the bottom of the larynx under the form of an ellipse of a yellowish

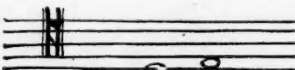
\* Communicated by Dr. Sharpey, Sec. R. S. Received March 22, 1865.

colour. The superior ligaments, together with the arytenoid-epiglottidean folds, assist to form the tube which surmounts the glottis; and being the lower and free extremity of that tube enframe the ellipse, the surface of which they enlarge or diminish according as they enter more or less into the ventricles. These last scarcely retain a trace of their opening. By anticipation, we might say of these cavities, that, as will afterwards appear clearly enough in these pages, they only afford to the two pair of ligaments a space in which they may easily range themselves. When the aryteno-epiglottidean folds contract, they lower the epiglottis, and make the superior orifice of the larynx considerably narrower.

The meeting of the lips of the glottis, naturally proceeding from the front towards the back, if this movement is well managed, it will allow, between the apophyses, of the formation of a triangular space, or inter-cartilaginous glottis, but one which, however, is closed as soon as the sounds are produced.

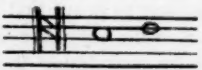

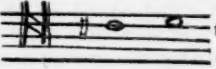
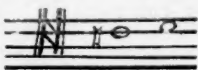
After some essays, we perceive that this internal disposition of the larynx is only visible when the epiglottis remains raised. But neither all the registers of the voice, nor all the degrees of intensity, are equally fitted for its taking this position. We soon discover that the brilliant and powerful sounds of the chest-register contract the cavity of the larynx, and close still more its orifice; and, on the contrary, that veiled notes, and notes of moderate power, open both so as to render any observation easy. The falsetto register especially possesses this prerogative, as well as the first notes of the head voice\*. So as to render these facts more precise, we will study in the voice of the tenor the ascending progression of the chest-register, and in the soprano that of the falsetto and head registers.

#### EMISSION OF THE CHEST-VOICE.

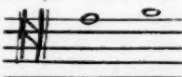
If we emit veiled and feeble sounds, the larynx opens at the notes *do*, *ré*, *mi*, ;† and we see the glottis agitated by large and loose vibrations throughout its entire extent. Its lips comprehend in their length the anterior apophyses of the arytenoid cartilages and the vocal cords; but, I repeat it, there remains no triangular space.

As the sounds ascend, the apophyses, which are slightly rounded on their internal side, by a gradual apposition commencing at the

\* † For foot-notes see bottom of next page.

back, encroach on the length of the glottis; and as soon as we reach the sounds si, do, , they finish by touching each other through  out their whole extent; but their summits are only solidly fixed one against the other at the notes do#, ré, . In some organs these summits are a little vacillating when they form the posterior end of the glottis, and the two or three half-tones which are formed show a certain want of purity and strength, which is very well known to singers. From the do#, ré,  the vibrations having become rounder and purer, are accomplished by the vocal ligaments alone, up to the end of the register.

The glottis at this moment presents the aspect of a line slightly swelled towards its middle, the length of which diminishes still more as the voice ascends. We also see that the cavity of the larynx has become very small, and that the superior ligaments have contracted the extent of the ellipse to less than one-half.

When instead of veiled and feeble sounds, we make use of full and vibrating ones the glottis becomes visible only at the sound mi, fa, 

and those above them, a limit which depends to a certain extent on the dexterity of the singer. For all the rest, the organs act as we have just said, but with a double difference: 1. The cavity of the larynx contracts itself more when the voice is intense, than when it is feeble. 2. The superior ligaments are contracted so as to reduce the small diameter of the ellipse to a width of two or three lines. But, however powerful these contractions may be, neither the cartilages of Wrisberg, nor the superior ligaments themselves, ever close sufficiently to prevent the passage of the air, or even to render

\* Let us here observe, that three registers of voice are generally admitted: chest, falsetto, and head. The first begins lower in a man's voice than in a woman's; the second extends equally in both voices; the third reaches higher in the female voice.

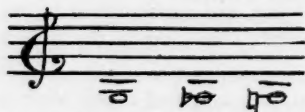
TABLE OF THE HUMAN VOICE IN ITS FULL EXTENT.



† The musical limits we establish in the course of these pages vary a little in each individual.

it difficult. This fact, which is verified also with regard to the falsetto and head-registers, suffices to prove that the superior ligaments do not fill a generative part in the formation of the voice. We may draw the same conclusion by considering the position occupied by the somewhat feeble muscles which correspond to these ligaments; they cover externally the extremity of the diverging fibres of the thyro-arytenoid muscles, and take part especially in the contractions of the cavity of the larynx during the formation of the high notes of the chest—and of the head-registers.

#### PRODUCTION OF THE FALSETTO.

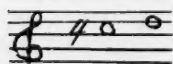


The low notes of the falsetto, sol, lap, la#, show the glottis infinitely better than the unisons of the

chest-voice and produce vibrations more extended and more distinct. Its vibrating sides, formed by the anterior apophyses of the arytenoid cartilages, and by the ligaments, become gradually shorter as the voice ascends; at the notes la, si,



the apophyses take part only at their summits; and in these notes there results a weakness similar to that which we have remarked in the chest-notes an octave below. At the notes do#, ré, the ligaments alone continue to act; then



begins the series of notes called *head-voice*. The moment in which the action of the apophyses ceases, exhibits in the female voice a very sensible difference at once to the ear and in the organ itself. Lastly, we verify, that, up to the highest sound of the register, the glottis continues to diminish in length and in width.

If we compare the two registers in these movements, we shall find some analogies in them; the sides of the glottis, formed at first by the apophyses and the ligaments, become shorter by degrees, and end by consisting only of the ligaments. The chest-register is divided into two parts, corresponding to these two states of the glottis. The register of falsetto-head presents a complete similarity, and in a still more striking manner.

On other points, on the contrary, these same registers are very unlike. The length of the glottis necessary to form a falsetto note, always exceeds that which produces the unison of the chest. The movements which agitate the sides of the glottis are also augmented,

and keep the vibrating orifice continually half opened, which naturally produces a great waste of air. A last difference is in the increased extent of that elliptic surface.

All these circumstances, which we shall refer to again, show in the mechanism of the falsetto, a state of relaxation, which we do not find in the same degree in the chest-register.

#### MANNER IN WHICH THE SOUNDS ARE FORMED.

As we have just said, and what we have seen proves it, the inferior ligaments, at the bottom of the larynx, form exclusively voice, whatever may be its register or its intensity; for they alone vibrate at the bottom of the larynx\*. But by virtue of what principle is the voice formed? It seems to me, that the answer to this question can be but this; the voice is formed in one unique manner—*by the compressions and the expansions of the air, or the successive and regular explosions which it produces in passing through the glottis.*

The ligaments of the glottis are situated about the mean level of the upper border of the cricoid, close the passage, and present a resistance to the air. As soon as the air has accumulated sufficiently, it parts these folds and produces an explosion. But at the same instant, by virtue of their elasticity, and the pressure from below being relieved, they meet again to give rise to a fresh explosion. A series of these compressions and expansions, or of explosions, occasioned by the expansive force of the air and the reaction of the glottis, produces the voice.

This theory, though now generally admitted for reeds, and undoubtedly evident in the liquid vein, the toothed-wheel of Savart, the syrène of the Baron Cagnard Latour, etc., has not to my knowledge, been yet applied to the glottis†. If we consider that the lips of this aperture, taken separately, can give no kind of sound, however we may try to make them speak, we must admit that the sounds which they give by their mutual action, are only owing to the explosions of the air produced by their stroke‡. It is not necessary in order to obtain the explosion of sound, that the glottis should be perfectly closed each time after its opening; it suffices that it should oppose an obstacle to the air capable of developing its elasticity. In this case the rushing of the air is heard accompanying the

\* We gladly acknowledge that this most important fact has been already announced by J. Muller, although we have our objections to the theory which accompanies it.—*Handbuch der Physiologie des Menschen.*

† I find that Dr. Muller hints at the possibility of the voice being thus formed, but only to attack and reject the notion.—*Ibidem.*

‡ Many controversies have arisen respecting the sounds sometimes emitted by animals after the section of the superior and recurrent laryngeal nerves; sounds which have been perhaps occasioned by the struggling of the animal causing a swelling of the neck and a mechanical contact of the vocal ligaments. However, without doubt, after the section of these nerves, voice, as a voluntary act, can no longer take place.

sounds, and they take a veiled, and sometimes an extremely muffled character; an observation which we have already presented to the reader's notice in speaking of the falsetto.

#### CONJECTURE ON THE FORMATION OF THE DIFFERENT REGISTERS.

As the entire system of vibrations arises solely from the inferior ligaments, it is evident that the cause of the different tones called registers, must be sought for in the muscles which set these ligaments in motion; and that the other parts of the larynx must be considered only as apparatus for strengthening the sounds obtained, and for modifying their quality. In our efforts to discover the more intimate processes of the vocal organs which produce the sounds, we shall recur at once to the observations already mentioned, to some anatomical remarks which we are going to make, and to the sensations which we feel in the organ itself whilst it is producing sounds.

If we detach one of the halves of the thyroid cartilage, we shall see a large muscular surface of oblique fibres, which fills all the space between the arytenoid and thyroid cartilages. At its upper end is to be seen the muscle corresponding to the superior vocal ligaments, and which sometimes extends to the notch in the thyroid. After detaching this generally frail muscle, all the fibres constituting this muscular surface seem to start from two opposite centres, viz.: the anterior surface of the arytenoid, and the re-entering angle of the thyroid. These centres, occupying the extremities of a diagonal line, send their fibres towards each other in parallel lines. Those which start from the anterior face of the arytenoid descend obliquely; the most external ones go to the cricoid, whose posterior half they cover at the side; the most internal ones descend to the vocal membrane\*, which they cover entirely. The fibres which terminate at the membrane become longer, as they become more internal. Those which start from the re-entering angle of the thyroid, re-ascend obliquely to the summit of the arytenoid, then diverge in order to form the sides of the ventricles, and then disappear in the aryteno-epiglottidean folds and even the under surface of the epiglottis. If we cut it away in successive layers, proceeding *from* the outside *to* the in, we reach a thick bundle of fibres, perfectly horizontal, which line the outer aspect of the vocal ligament, and which go from the anterior apophyses of the arytenoid to the re-entering angle of the thyroid†.

This bundle has its posterior half covered by the lateral crico-arytenoid muscle, and its anterior half by the diverging fibres which

\* We thus designate that part of the membrane which goes from the bottom of the vocal ligament to the edge of the cricoid.

† Another portion of the thyro-arytenoid muscle.

start from the thyroid. If we cut away the horizontal bundle in successive layers, we see that the fibres are not all of the same length; the most external fibres are the longest, and the succeeding ones get gradually shorter as they become more internal; but they all originate in the anterior cavity of the arytenoid, and the muscle is inserted in the manner above explained throughout the whole length of the vocal ligaments, the thyro-arytenoid portion of it excepted. As the fibres all begin from the arytenoid, and terminate successively at more distant points of the membrane, we see that the muscle is thicker behind than before.

Thus the vocal ligament, and the membrane which depends from it, the sole sources of all vocal sounds, are under the direct action of the fibres which come from the anterior cavity of the arytenoid; the ligament under the action of the horizontal bundle, the membrane under that of the oblique fibres. The long horizontal fibres, extending from one cartilage to the other, are placed at the exterior of the short horizontal fibres, and at the interior of the oblique fibres. The diverging fibres which start from the thyroid, acting only on the superior vocal ligaments and the folds, seem to influence by their contractions only the quality and the volume of the voice.

The remarkable arrangement of the fibres which we have just examined, enables us to explain a fundamental fact—the elevation of the voice. The fibres of the horizontal bundle being placed over each other, in layers, one covering the other, and getting gradually longer and longer, as they become more external, extend their action to the more anterior parts of the edges of the glottis. This progressive action from the back to the front, encroaches gradually on the length of the vibrating portion of the ligament, and likewise increases its tension, and its faculty of accelerating its pulsations.

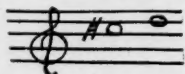
Another portion of the thyro-arytenoid muscle at the same time stretches and raises the vocal membrane more and more, causing a lesser depth of the ligaments to be in contact, in proportion as the sounds become higher, and thus assists by increasing the mobility of the ligaments.

We shall see in a few moments that the rotatory movement, which the external fibres of the lateral crico-arytenoid muscles give to the arytenoid, by making the vocal membrane deeper, partly counteracts the above effect, and produces the chest-register.

The crico-thyroid muscle, on the contrary, is a powerful auxiliary in the elevation of the voice. This muscle, which at the same time causes the thyroid to come forwards and downwards, gives rise to a mechanical tension, not only in the vocal ligament, but even in the

whole vocal membrane. The meeting of the thyroid and the cricoid cartilages, which we can feel by the touch, becomes especially marked when the inter-ligamentous glottis alone produces the sounds, which takes place as we have seen at the notes *do*<sup>a</sup>, *ré*<sup>a</sup>,

in the chest-register, and an octave above for that of the head; with this difference, however, that for the latter a more vigorous and complete connection is necessary.



Let us now see what we may learn from the sensations we feel in the vocal organ? When we produce a chest-note, the least attention enables us to distinguish a "*pinching*" at the posterior part of the glottis, which becomes more vigorous as the notes ascend. This pinching seems to be formed by extension of the depth of the touching surfaces, and may become very painful; whilst the notes of falsetto, when higher than chest ones, give comparatively great relief to this part, and the surfaces in contact seem to have become thinner.

If we combine these sensations with the different remarks which have been furnished to us by the examination of the muscles, we can fix the particular mechanism of each register.

#### CHEST REGISTER.

In fact, when the arytenoid muscles have brought in contact the arytenoid cartilages, and closed the glottis, the voice may take two very different characters; nay, more, it will be produced in pitches widely apart from one another, and will give forth the chest, or falsetto registers, according as the fibres of the thyro-arytenoid attached to the vocal membrane are active or not. By the action of these fibres, as we have seen, this muscle raises the vocal membrane, and makes its appposable part thinner; whereas the lateral crico-arytenoid gives a rotatory movement to the cartilage, which brings the apophyses into deep contact. This deep contact, which continues even after the apophyses no longer partake in the vibrations, gives a deep tension to the membranes, increases the depth of their contact\*, and, as necessary consequence, augments the resistance they present to the air. It is to the extent of this resistance that we attribute the formation of the chest-register, so distinct by its particular amplitude. To it we attribute also the slowness of the beats of the glottis, and the consequent low pitch of the sounds, a pitch which, even in the highest tenor voices, is at least an octave lower than the head notes of ordinary soprano.

\* It is then that we feel the pinching of which we have spoken.

## REGISTER OF FALSETTO.

—When, on the contrary, the external fibres of the lateral crico-arytenoid muscle remain inactive, we produce the falsetto. The lips of the glottis, stretched by the horizontal bundle of the thyro-arytenoid, come in contact by their edge alone, formed at once by the ligament and the apophyses, and offer little resistance to the air. Hence arises the great loss of this agent, and the general weakness of the sounds produced here.

But as soon as we reach the sound do, the beats are produced by the ligaments exclusively, and we have attained the head-register. It is certain, as we may deduce from the movement of the ligaments, that then the vocal membrane is raised by the action of the fibres of the thyro-arytenoid muscle, and its surface is diminished to an edge; but we think that the external fibres of the lateral crico-arytenoid, which would prevent this movement, remain inactive. Then also the very decided tension, which the crico-thyroid muscle effects on the vocal tendons, and which accelerates their movements, takes place.

During the chest-register, therefore, the vocal ligaments are stretched, and are in contact to an extent corresponding with the depth of the anterior apophyses of the arytenoid, whilst in the falsetto the edges alone of the ligaments are stretched and apposed; in both cases the sounds being formed, not by the actual vibrations of either the whole or part of the tendons, but by the successive explosions which they allow.

## PRESSURE OF THE AIR.

Until now, in our remarks on the manner in which the voice is formed, we have only referred to the rigidity of the glottis, a rigidity necessary to accomplish the 1056 vibrations in one second\*, which form the do of the chest-voice, and to accomplish the double number which produces the octave in the head-voice. There is, notwithstanding, another indispensable element for the production of vocal sounds, the pressure of the air. Pressure, as is well known, develops an elastic force in this agent, in a degree inverse to the volume which it occupies. It is by means of this power that the intensity of the sounds is obtained. The intensity of the sound can only depend on the quantity of air which goes to each *sharp* explosion. I say *sharp* explosion, as an express condition; the glottis should close itself perfectly after every vibration; for if the air found a constant passage, as in the notes of the falsetto, then the greatest

\* Pouillet, Physique, Sixth Edition, Vol. II., page 77.

movements of the glottis, and the greatest waste of air, would produce precisely the weakest notes. To reject this theory would be to attribute the intensity of the sound to the extent of the vibrations accomplished by the lips of the glottis, and to suppose that these lips, each taken separately, possess the power of producing sounds, suppositions quite contrary to the facts. The elastic force of the air arises not only from the compression of the lungs, but also from the contractions of the trachea, which adjusts its calibre to the different dimensions of the glottis. It is by means of this force that the air conquers the continually-increasing obstacle presented by the lips of the glottis when they produce sounds more and more intense.

Thus the problem of the elevation of the voice, always complicated with that of its intensity, in order to be complete, ought to show the connection which exists between the tension of the lips of the glottis, the pressure of the air, and the number and intensity of the explosions obtained. As a consequence, we may state that the greater pressure of air necessary to produce the greater intensity, would at the same time increase the number of pulsations, and so raise the tone; but to prevent this, the glottis must at the same time be lengthened, and *vice versa*, or, in other words, that the different lengths of the glottis can, under different degrees of pressure, produce the same number of shocks, but at different degrees of intensity.

#### OF THE QUALITIES OF THE VOICE.

Various simultaneous causes modify the qualities of the voice: 1, according as the glottis partially or entirely closes the passage between the explosions, it produces veiled or brilliant sounds; 2, the tube which surmounts and surrounds it also greatly affects the quality of the voice; by its contractions it gives brilliancy to it and by its widening volume; 3, the opiglottis also plays a very important part, for every time it lowers itself, and nearly closes the orifice of the larynx, the voice gains in brilliancy; and when, on the other hand, it is drawn up, the voice immediately becomes veiled.

*From Proceedings of the Royal Society. of London. 1854-55 London, p. 399-410.*

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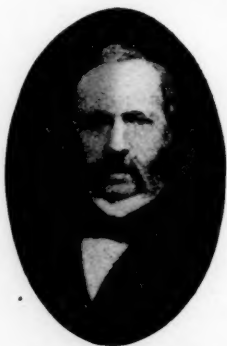
DR. HANS WILHELM MEYER



DR. KARL CZERMAK



SIR MORELL MACKENZIE

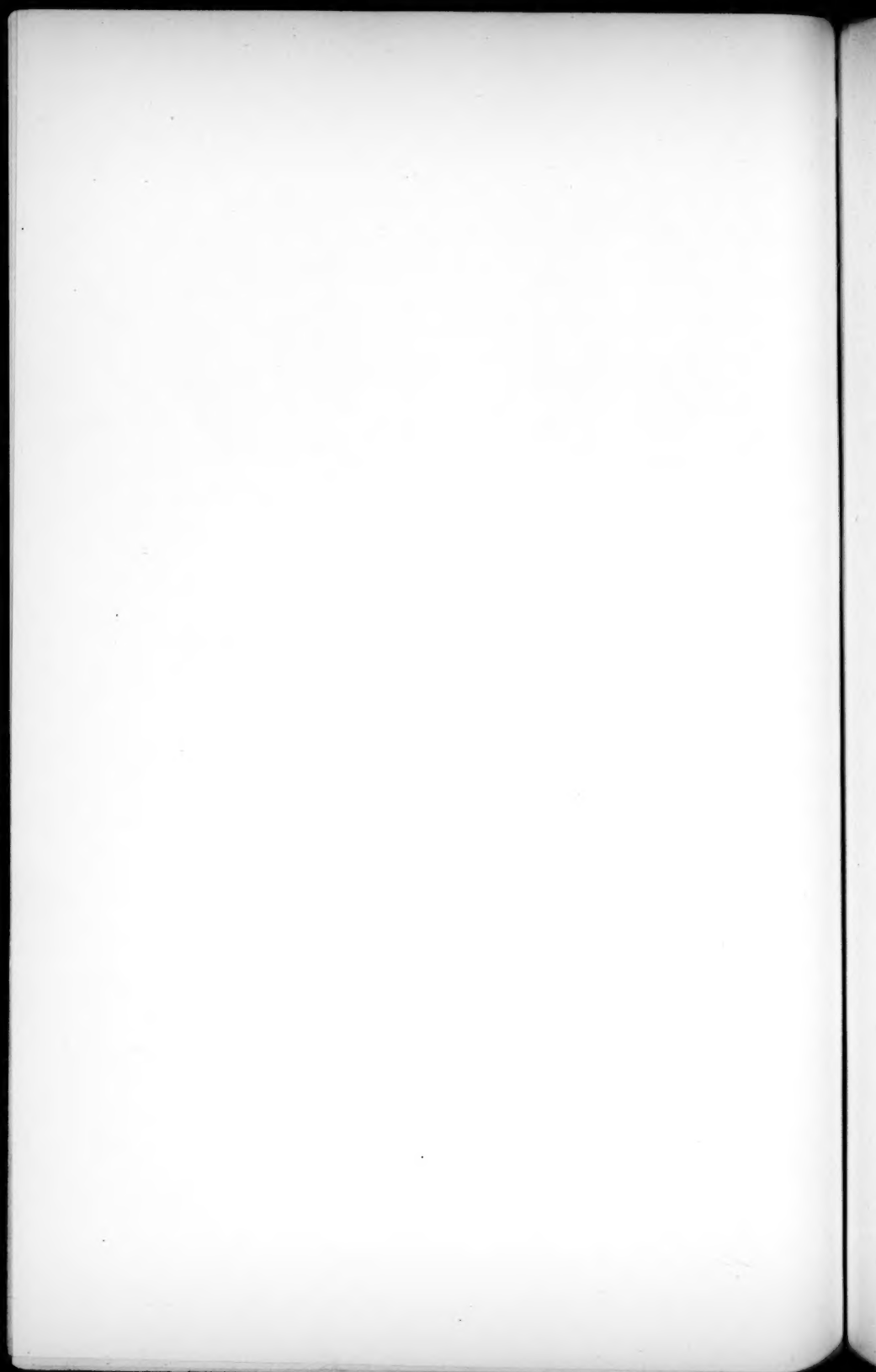


DR. HORACE GREEN



DR. LOUIS ELSBERG

PIONEERS IN LARYNGOLOGY



## IN MEMORIAM.

BY SIR FELIX SEMON, C.V.O., M.D.

Physician-Extraordinary to H. M. King Edward VII.

The Centenary of Manuel Garcia, which we hope to celebrate in the course of the present month, almost exactly coincides with the jubilee of laryngology. Whilst the date of the hundredth birthday of the venerable master is March the 17th, the number of the "Proceedings of the Royal Society of London," in which his epoch-making paper on the physiology of the human voice was published, appeared on March the 22nd, 1855. Thus only five days separate the hundredth birthday of the inventor from the fiftieth birthday of the publication of his immortal invention.

Under these circumstances, when our warmest wishes are this month extended to the Centenarian, our thoughts also naturally gratefully travel to those of his lieutenants, who acted as pioneers of the new science created by him, and most, of whom are, alas, no longer with us.

It is not with a view of giving an elaborate history of the early times of laryngology, but merely with the object of recalling to our memories in these days the names of some of the foremost early laryngologists that the following lines are written.

It goes without saying that *primo loco* the names of Türk and Czermak have to be mentioned. If to the former are due the rescue of Garcia's almost forgotten paper, and the first application of the laryngoscope towards the diagnosis and treatment of disease, as well as in later days his magnificent textbook and atlas on diseases of the larynx, it can not be gainsaid that the first clear conception of the medical importance of the laryngoscope belongs to Czermak, who additionally through his zeal in making proselytes, and through his visits to, and demonstrations of the new science at, most of the European seats of learning, popularized its use more quickly than would otherwise probably have been the case.

They both had pupils, and founded schools at an early date after the introduction of the laryngoscope into the medical instrumentarium. Türck may be justly called the father of the Viennese school, which for a long time was looked upon as the Mecca of laryngoscopic instruction. Physicians from all parts of the world made pilgrimages to Vienna to sit at his feet, and, later on, to learn from that distinguished triad, who for many years so worthily upheld the laryngoscopic fame of the old "Kaiserstadt:" Schroetter, Stoerk, and Schnitzler. Only the first of these early masters of laryngology has been spared to live and see the jubilee of the science, which he has done so much to adorn; Stoerk, one of the most original laryngological thinkers, and Schnitzler, one of its most fluent exponents, have been removed from our midst a good many years ago. Their fate has been recently shared by Semeleder—a name once famous in the annals of laryngology, but now merely historical.

In Germany a small group of professors of internal medicine and surgery recognized at a very early period the value of the laryngoscope for the diagnosis and treatment of laryngeal disease. The names here to be mentioned are those of Traube, the first man who ever laryngoscopically observed paralysis of the recurrent laryngeal nerve; von Ziemssen, whose classical chapters on laryngeal diseases in his own great *Encyclopædia* are, I am afraid, no longer read as much as they deserve; Karl Gerhardt, who benefitted our specialty, not merely by the originality of his contributions, but particularly by the precision and accuracy of his descriptions; Franz Riegel, whose classical chapters on abductor paralysis firmly established the pathology of that disease, and Victor von Bruns, the father of intralaryngeal surgery.

To the men just named, whilst they recognized the importance of the method, it still remained merely incidental to their general work. Soon, however, ardent disciples began to devote themselves more exclusively to its study and propagation. The names of Lewin, Tobold, Waldenburg, and Voltolini must here be called to our recollection, the latter being one of the most original figures in the history of laryngology. Of all these, alas, the only one who still remains with us is Tobold; all the other early German laryngologists have joined the majority.

The same sad tale must be told of French laryngology. Here the names of Mandl, Kreishaber, Fauvel, Fournié, Moura-Bourouillou belong to the glories of the past and none of those who were the creators of the French school are, so far as I am aware, still alive.

And again, the same, or nearly the same, must be said of Great Britain and Ireland. Here, where Sir Duncan Gibb, Sir Morell Mackenzie, Sir George Johnson, and Sir Philip Smily were amongst the first disciples of Czermak, one only of that circle, Dr. Walker, of Peterborough, survives and continues to take active interest in the science whose infancy he has witnessed. His co-pioneers have passed away.

The longevity of American laryngologists has fortunately been greater than that of their European confrères. Though the lamented Louis Elsberg, to whose enthusiasm and energy so much of the advancement of American laryngology is due, was taken from us many years ago, contemporaries of his, deserving of warm recognition for the share they have taken in his work, happily still remain. The respected names of Solis Cohen, Lefferts, and Knight will occur to every reader of this paper.

The above short enumeration does not claim to be exhaustive. The names of Böckel, Burow, Labus, Massei, Oertel, Schech, Ariza, Jelenffy, Gottstein, Wilhelm Meyer, Max Schäffer, Gouguenheim, Beschorner, B. Fraenkel, Rauchfuss, and others fully deserve to be mentioned when the early history of laryngology is recalled, but some of these are happily still working with undiminished energy amongst us, and the particular purpose of this short article has been to gratefully recall in these days the memory of those to whom Fate has not vouchsafed to live and see the jubilee of that new branch of medical science to which they had so successfully devoted their labours.

Many readers of these lines will no doubt be struck by the same thought that has often occurred to their writer, viz., how shortlived on the whole the leaders of the laryngological world have been and how many have been taken from us in the full prime of their manhood! But if this thought is apt to make us somewhat melancholy, we have the more reason to thank kind fate, that it has spared the originator of the whole movement, our father, Manuel Garcia, to live to the jubilee of the specialty, which he so worthily inaugurated. We all join today in heartily wishing him many further years in equally undiminished vigour of body and mind as that enjoyed by him on his hundredth birthday.

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## THE PIONEERS OF LARYNGOLOGY.

BY FAYETTE C. EWING, M.D.

Fellow of the British Rhinological, Laryngological and Otological Association, etc.

"By mutual confidence and mutual aid  
Great deeds are done and great discoveries made;  
The wise new prudence from the wise acquire,  
And one great hero fans another's fire." —Homer.

Manuel Garcia's achievement is the great white light of an illuminating current extending through a century. Brilliant indeed this laryngological line, and more brilliant in spots, of which the chief center of light is Garcia's achievement.

Homer's sentiment is true of laryngological advance before him, and equally true of its progress after him. The fire that was to illumine the larynx was smouldering for fifty years previous to Garcia's announcement. It has burned with increasing brightness the fifty years since; but strange as it may seem, the single-hearted singing master was ignorant of the endeavors of his predecessors. He knew nothing of Bozzini, Cogniard de la Tour, Babbington, Liston, Baumes, Trousseau, Belloc, Selligne, Brunati, Worden, Avery and Cutter, heroes who had successively fanned one another's fire from the advent of the century into the very glow of his own splendid enlightenment. The light that was "hovering in the air" was no *ignis fatuus* caught in an elusive moment and turned to utility, after others had been led through maze and haze, but rather as that other one that never had been seen on sea or shore. To Garcia it was a new manifestation. For Garcia's profession was not scientific in the medical aspect; if, indeed, a science, it was only auxiliary to the one it was to illumine and the one it was to create. Like the fathers of this republic, he "builded better than he knew" when with his little mirror he showed us something new under the sun. As we have said, his life and work were set apart from the medical fraternity, and little he

knew of the men who for fifty years had been asserting the practicality of a scientific achievement synonymous with his own, but without success in making it manifest. For Garcia, there was no "mutual confidence" to inspire, no "mutual aid" to guide, and when his dream took the form of reality it ranked as one of the "great discoveries," and his simple report to the Royal Society of London stands as one of the "great deeds."

Slowly, very slowly, great ideas come to their fruition, and that it was not so with Garcia argues not Homer wrong. It is because the world is not ready for the revelation, the world so ever quick to stone its prophets. It may not be that the idea is barren, but the world cannot conceive. Likely, had the world been ready to look into the larynx, it would not have waited for a singing master to demonstrate what many medical men had declared practicable. Garcia was prepared to take the tide at its flood, when it meant much for himself and more for the world. But because of his ignorance of what others had done, and of his own self-dependence, we cannot pluck one leaf from his laurel; because of the impetus his practical demonstration of an idea gave to a science, we call him the Father of Laryngology.

Very soon after he made his announcement, the world was afire with the idea. Editors of journals proclaimed it and societies discussed it. The day of denial was short. Probably the first of the many scientists to fan the hero's fire were Türck and Czermak, names indissolubly associated in an unfortunate controversy over precedence in adaptation and development. In the light which his own great personality shed upon the darkened way, we may forgive Türck for his Promethean assault upon the divine fire of Garcia. Türck preceded Czermak in the employment of the mirrors, but Czermak was one year ahead of him in the publishment of the results of their work. However, their labors were so simultaneous, and the advancement of the idea so uniform, that posterity can do no better than acquiesce in the decision of the Academy of Sciences of the Imperial Institute of France which awarded to each, twelve thousand francs, after a commission, appointed by it, had investigated their contending claims. Türck was untiring in his endeavors to advance the new science. His brochure published in 1860 was one year behind Czermak's, both of which did much to make laryngoscopy popular. But Türck wrote incessantly, frequently, contentiously, and while he claimed precedence of Garcia in the successful mirror examination of the larynx, which is conclusively denied, he was powerful in the spread of knowledge of the pathology of the organ.

His books and pamphlets, which were translated into the English and French, described conditions in various diseases as diphtheria, syphilis, lupus, edema, tumors, etc.

It was in 1858 that Czermak published an article in a Viennese journal advocating lamplight instead of sunlight as employed by Garcia and Türck. He specially urged persistence in manipulation as useful in overcoming difficulties in technic. Later he suggested the head mirror. His subsequent claim that but for the invention of the head mirror, laryngoscopy would have been a "dead born child" is simple truth. This first publication of Czermak's did much towards prodding into activity the inertia of less virile minds. Czermak also deserves credit for his demonstration of a post-rhinocopy and he was first to introduce the mirror through a tracheal fissure and reveal the lower surface of the vocal chords.

While we have not space to detail the achievements of many less prominent among these pioneers of laryngology, nor to consider the many valuable contributions of living laryngologists whose names the medical world will not willingly let die, we should not pass over Semeleder, pupil of Czermak, early in pathological explorations of the tongue and epiglottis. Stork and Gerhardt who studied specially intra-laryngology, and practiced intra-laryngologic applications, confirming the claims of Horace Green in America, made long before Garcia's announcement, that he had applied nitrate of silver to the interior of the larynx with an applicator; and Voltolini, who advanced Czermak's post-rhinoscopic idea when he dispensed with the palate retractor of the latter. He also invented an apparatus by which he employed burning oxygen gas in incandescent light for examination of both ear and throat. Voltolini and Semeleder invoked the aid of post-rhinocopy in the passage of the Eustachian catheter, and to the former belongs special credit for increasing knowledge of the galvano-cautery and post-pharyngoscopy. Tobold was active in promoting the new science in Berlin, and as early as 1863 he invented the stand-reflecting mirror, which was later modified into the "Tobold apparatus."

Rauchfuss was the pioneer who piloted laryngology into and through the dark waters of the Russian scientific world. His first communication, "Zur laryngoskopischen Technik" appeared in the St. Petersburg Zeitsch. in 1861. This paper established laryngoscopy and the practicability of intra-laryngeal operations in "darkest Russia."

With the development of laryngology in England, the name of Morell Mackenzie is eternally associated as pioneer and leader. After visiting Czermak in 1859, he returned to London and led the vanguard composed of Gibb, Prosser James, Windsor and a few other choice spirits to the battle for the establishment of laryngology in the territory of medical and surgical science. In 1863 he won the Jackson prize of the Royal College of Surgeons for his paper on "The Pathology and Treatment of Laryngeal Disease." A little later he published an article on "The Use of the Laryngoscope in Disease of the Throat with an Appendix for Rhinoscopy." His great work on "Disease of the Nose and Throat" which has done so much to develop laryngology is still our greatest English classic and likely to remain so.

America, always quick to receive and adopt ideas, was not behind the Old World in accepting and developing the new science. Sprangenwald, Church, Krackowitzer, Douglass and Cutter, in the period from 1860 to 1863, are names to conjure with in any survey of the history of American Laryngology. In our enumeration of the heroes who fanned Garcia's fire in the New World, special homage is due Horace Green and Louis Elsberg. Horace Green, who had long before Garcia's report fought a manly fight, in the face of vituperation and denial by hosts of practitioners, to establish the fact that he made intra-laryngeal applications of nitrate of silver and cured laryngeal catarrh therewith, was quick to accept and confirm Garcia's achievement. Let us be thankful that he lived until 1866, three years after Elsberg had proved to the New York Academy of Medicine and the American Medical Association the truth of his claims. To Louis Elsberg, Laryngology owes more than to anyone else for the speedy acceptance it secured in America. He was the first American teacher of the art, demonstrating to his students the use of instruments some time before their acceptance by the profession at large, even before his papers on the subject which first appeared in 1862 and frequently afterwards. He had been teaching the art in the medical department of the University of New York for seven years before his work was sufficiently recognized for the directors to accord him the title of Professor. This was in 1868, and very rapidly after this the colleges and clinics of New York and other cities recognized laryngology as one of the not to be ignored departments of medical science.

The intricate nerve and cell connection, with contiguity of organs, have so broadened the sphere of laryngology, that the science now

embraces all of the respiratory passages that come within the light of the laryngoscope. The intimate relationship and inter-dependence of these various parts of the throat and nose have compelled a notice in this paper of men whose work was extra-laryngeal. Of these, was Wilhelm Meyer of Copenhagen whose discovery of adenoids must be ranked as more important and far reaching in its effects than any growing out of Garcia's revolutionary revelation. This one contribution from little Denmark has immortalized Meyer, and given his nation an honorable place forever, among those which receive and reflect the light, for it touched the very life breath of human health and happiness. Nothing of consequence has been added to our knowledge of adenoids since Meyer's annunciation, and if all that has since been written on the subject was blotted out, our science would be none the poorer. He added to human strength, he contributed to human comfort; he opened the ears of the deaf; and made mankind more beautiful in form and feature; he toned and tuned that marvellous instrument, the human voice and shut the very doors of insane asylums upon the frail and the wretched. And generations to come need not, as now, look upon pictures of the pinched, dull faces of their ancestors, in album and gallery, from a special disease; they may not listen to the voices of their preachers and prophets while they "draw their breath in pain and tell their story," nor hear their little children's trebles "like sweet bells jangled, harsh and out of tune."

And if at our conclusion cynic or skeptic should ask "What avails it?" that "such as these have lived and died" we should rise up and summon tens of thousands to tell us, out of their own experiences, that for Garcia's sake and the pioneers who fanned his fire, life is stronger and longer, sweeter in story and softer in song, and the "human form divine" imaged more "like a God."

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## CHRONIC LARYNGITIS.

BY E. FLETCHER INGALS, M.D., CHICAGO.

Synonymes—Chronic catarrh of the larynx—Laryngitis chronica.

*Pathology.* The variations from the normal in chronic laryngitis even of long duration, may be slight and superficial, and limited chiefly to modifications of secretion and circulation; but in the severer grades in the course of time structural changes take place which profoundly and often permanently alter the mucous and sub-mucous structures. The changes visible to the eye will be described with the laryngoscopic appearances. The modifications of structure shown by the microscope are mainly hypertrophic and affect the epithelium, mucosa and sub-mucosa.

The histologic changes in the epithelial layer in inveterate laryngitis consist chiefly in the ciliated variety and in increase in the number of layers of squamous cells in the parts of the larynx normally bearing pavement epithelium. These are: the cord, the upper part of the inter-arytenoid space and the free border of the ary-epiglottic folds and ventricular bands. This change to a cutis-like epithelial lining of the larynx is especially marked over the region of the processus vocales and here at times form warty masses with large papillæ and epithelial prolongations into the sub-epithelial tissue. Similar verrucous outgrowths may appear upon the free border of the cords and the whole laryngeal lining in rare cases may become dermoid. The change to pavement epithelium is accompanied by the formation of papillæ which appear even where there is normally a smooth basement membrane under ciliated cells. The papillæ may branch as do those of papillomata so that there is close histologic relation between papilloma of the larynx and the superficial hypertrophies of chronic laryngitis.

Erosions of the pathologically altered epithelium may occur and the ulcerative process may even reach into the sub-epithelial tissues but not deeply enough to create permanent loss of substance. The favorite seat of erosions is the free border of the cords and on the inter-arytenoid mucosa, where they commonly appear as small yellowish, triangular spots, the apices of which extend six or eight millimetres upward from the posterior ends of the vocal cords.

Connective tissue hypertrophy is even a more marked feature of chronic laryngitis than thickening of the epithelium. In the earlier stages there is much round celled infiltration and creation of young

connective tissue, with an abundance of vessels, but later spindle cells and vessels are less numerous and the hypertrophic swellings consist of hard and dense connective tissue, which is especially characteristic of sub-glottic chronic laryngitis. Even in this late stage, a good deal of leucocytosis is generally found under the epithelium. Atrophy of the histologic elements of the laryngeal mucosa is an infrequent sequence of hypertrophy which is most apt to result from chronic dry suppurative catarrh with crust formation, analogous to nasal ozæna.

The venous congestion attendant upon chronic laryngitis induces the hypertrophic states mentioned by furnishing an excess of plasma to the tissues. Deep-seated connective tissue changes may lead to atrophy and fatty degeneration of the laryngeal muscles. The improperly nourished walls of the veins lose their elasticity and give way to the blood-pressure so that they become varicose and ectatic in some instances. This condition is especially well shown upon the cords but it may involve other parts of the larynx.

*Etiology.* An important cause of chronic laryngitis is disease of the upper air passages more especially hypertrophic rhinitis attended by intermittent mouth breathing so that the air is not properly warmed before it reaches the larynx. Again nasal obstruction from whatever cause necessitates an undue effort in the use of the voice to overcome the obstacle to sound whereby congestion is increased and a chronic catarrhal inflammation finally results. The type of chronic laryngitis thus produced, although common, is seldom attended by pronounced anatomical changes, so that freeing the nasal passages alone may result in its cure. Atrophic rhinitis and pharyngitis sicca are sometimes accompanied by a similar dry catarrh of the larynx and trachea with adherent scabs and crusts. The nasal ozæna may precede that of the larynx and trachea for years, but does not always do so as laryngitis sicca may exist with a normal nasal and pharyngeal cavity.

Naso-pharyngeal catarrh, chronic follicular suppuration of the tonsils and purulent discharges from the naris or from the accessory sinuses of the nose sometimes appear to cause chronic laryngitis.

Pulmonary tuberculosis is a frequent cause of the hypertrophic forms of laryngeal catarrh and it is therefore important to examine the lungs in every case of persistent laryngeal inflammation. It should be remembered, however, that simple chronic non-tubercular laryngitis is a common accompaniment of phthisis.

Conditions that obstruct the return flow of blood through the veins of the larynx, such as tumors of the neck, goitre, mediasti-

nal tumors, chronic valvular disease of the heart or pulmonary emphysema produce persistent venous hyperæmia that predisposes to chronic laryngitis and as the causes mentioned are often lasting, they produce an intractable form of laryngeal disease.

A considerable proportion of youths passing through the change of voice called mutation become afflicted with chronic laryngitis, which is at times sufficiently severe to render the patient hoarse and this may continue a year or two.

Dry pharyngeal and laryngeal catarrh may be caused by diabetes and should therefore always lead to an examination of the urine for sugar. The influence of the elongation of the uvula as a source of laryngitis has been exaggerated; but in a few cases this condition is doubtless the source of cough and consequent mild catarrhal irritation of the larynx.

Chronic laryngitis is often caused by habitual alcoholism. Such cases are often attended by irremediable hypertrophic changes that deform the laryngeal interior and sometimes result in the typical pachydermia laryngis of Virchow. Overuse of the voice especially in the open air often causes this disease; examples of which are often seen in political speakers, singers, newsboys and peddlers. It has been observed by teachers in the poorer city districts that the boys do so much shouting on the noisy streets that their voices are unfit for singing on account of the resultant hoarseness.

Repeated attacks of acute laryngitis are perhaps the most frequent cause of the chronic, especially in patients whose resistance to disease is weakened by poor health and in those who are compelled to use the voice when hoarse, as so often occurs among actors. The inhalation of irritant matter, dust, especially if metallic, is a source of chronic laryngitis particularly in mouth breathers. Tobacco smoke and dry over-heated air act in a similar way.

Adenoid vegetations, nasal polypi and other causes of persistent mouth breathing, in my experience very seldom cause chronic laryngitis, although intermittent nasal obstruction, especially in rhinitis intumescens is a most frequent cause; indeed it appears to be the main etiological factor in this disease. When the nasal obstruction is persistent, the larynx accustoms itself to the inhalation of air which has not been moistened or freed from dust by the nasal passages, just as the trachea after tracheotomy will in a few weeks bear respiration through a canula without catarrhal reaction.

Infectious diseases, especially scarlet fever, typhoid fever, influenza and measles, not infrequently leave chronic laryngitis in their train. The influence of cold and damp climate in the production of this affection is marked.

*Symptoms.* The sensations of which complaint is usually made by the patient are dryness, tickling and burning in the laryngeal region. There is often annoyance caused by the feeling of a foreign substance in the throat, the location of which can not be accurately defined but which seems to prick the mucous membrane. In other cases the patient speaks of a lump in the throat when he swallows. There may be a constant desire to clear the larynx with the hope of bringing up mucus even if there be no secretion in the larynx. This is apparently caused by swelling of the mucous membrane. In some there is an almost constant inclination to swallow.

In some patients cough is violent and constant, especially if the sensitive inter-arytenoid region be the seat of erosions. In others, tickling sensations cause frequent efforts to clear the throat; but in some the cough is very slight and in others this symptom is entirely absent. Dried secretions usually cause cough until expelled but where the epithelial surface of the mucous becomes dermoid, as it often does in laryngo-tracheitis sicca, the mucous membrane loses its sensitiveness.

Spasms of the glottis is an occasional and distressing symptom, especially when the irritable inter-arytenoid region becomes eroded and raw by the frequent efforts to clear the throat. The spasm may even cause suffocative attacks and syncope.

The voice may be altered from slight huskiness to complete aphonia, according to the pathological changes in the mucosa, the quantity and character of secretion in the larynx and the condition of the laryngeal muscles. The vocal tones are usually deeper than normal and rough or grating, seldom higher pitched than in health. The hoarseness may appear only during singing, or the singing tones may be clear while the ordinary voice is rough. In some patients huskiness is present in the morning until the vocal cords are freed from mucus, the voice then becomes clear and remains so for some hours until the larynx becomes congested from speaking. In some instances the taking of food greatly clears the voice. In almost all forms of chronic laryngitis continued speaking or singing soon produces sensations of fatigue which are at first confined to the larynx, but if the exertion is continued, a feeling of general physical exhaustion may come on after twenty or thirty minutes.

The amount of secretion varies greatly. Some patients do not have to clear the throat at all and have no disagreeable sensations in it, especially if the inflammation is confined to the cords. Some raise only a little clear mucus or saliva while others expectorate quantities of pus or muco-pus and still others with difficulty, bring up crusts of mucous, sometimes, mixed with blood.

Serious stenosis due to hypertrophic changes in the larynx at the level of or above the cords is extremely rare, but the swelling of the sub-glottic mucous membrane occasionally causes dangerous dyspnoea. Accumulation of dried secretions may also lead to attacks of suffocation.

The laryngoscopic view in chronic laryngitis may show either localized or diffuse congestion of the mucous membrane, varying from a slight pink color to a deep red or cyanotic hue.

In the milder types of the affection all that may be seen even after years is a diffuse red or pink color of the cords not differing from that of acute laryngitis, with little or no swelling while the rest of the larynx appears normal. Where the epithelium is thickened, the color may be greyish white. Dilated veins may form a network of vessels upon the cords and in other regions.

Instead of the soft inflammatory swellings seen in the acute affection, in chronic laryngitis, there is often dense hypertrophy of the tissues combined with chronic cedema which is usually limited to certain parts of the larynx. The epiglottis is rarely affected but may lose its elasticity and become clubbed and stiffened, while its color becomes dark red and tortuous veinlets appear on its surface. The aryteno-epiglottic folds are seldom thickened, but the ventricular bands are very prone to hypertrophy. They usually retain their general shape and form smooth, red or grayish-red pillow-like swellings, that interfere with the voice by lying as dampers upon the vocal cords. The latter may also be held apart by the swollen ventricular bands meeting in the centre before the cords can come together. In these instances the glottis can not close, so that the voice is lost or the approximated false cords vibrate in place of the true ones, emitting a harsh tone. In rare cases the swollen ventricular bands are said to hang down between the cords. Instead of being smooth the hypertrophic false cords may be wrinkled and convoluted or nodular, and their substance may be very firm and tough.

Chronic laryngitis may be mostly or altogether confined to the posterior commissure or inter-arytenoid space. In the milder cases there may be only a dull whitish thickening of the epithelium, while the mucosa, which appears smooth during abduction of the cords, wrinkles into vertical folds during adduction, which may be mistaken for vegetations. In severer cases the hypertrophic inter-arytenoid mucosa forms a uniform or nodular prominence which wedges itself between the processus vocales and causes hoarseness or aphonia. Krieg found that inter-arytenoid hypertrophy was a frequent cause of chronic hoarseness in children. The inter-arytenoid mucosa is the most sensitive portion of the larynx, and chronic ca-

tarrh of this region is therefore often the cause of severe cough, especially as secretions are prone to lodge here in the irregularities of the hypertrophic surface. The constant motion of the part also creates and perpetuates erosions and epithelial defects. The mucosa covering the arytenoid cartilages and the cartilages of Santorini and Wrisberg has normally a somewhat pyramidal form and allows the contour of the cartilages be seen, but when thickened by chronic inflammation, these parts assume a hemispherical form and become flabby and succulent, so that the cartilages are hidden. These arytenoid swellings are liable to pressure during deglutition, and they sometimes give rise to the feeling of a foreign body in the throat.

The cords, in chronic laryngitis usually lose their normal sheen and may appear red, reddish gray or even pale, and may appear smaller than normal or more or less swollen; sometimes they form red cylindrical clumsy folds. Their surface is often irregular: when marked by numerous small elevations, the condition is termed by Türk chorditis tuberosa. When numerous papillæ are hypertrophied they present a granular appearance called laryngitis granulosa.

A serious and irremediable result of chronic laryngitis is softening of the cords. As a result of the chronic inflammation, the membranous portion of the cords may undergo degeneration and absorption leaving in their place two flabby cushions incapable of sound vibration.

Chronic sub-glottic laryngitis affects the loosely attached mucosa of the under surface of the cords and usually appears as two grayish, pink or red folds that may be continuous with the lower surface of the cord or be separated from it by a furrow. In other instances the hypertrophy may cause an irregular mass and may be confined to one side. In these cases the vocal cords may be involved in the swelling or may remain normal. Sokolowsky who describes a number of such cases occurring in young adults, states that the disease commonly begins with hoarseness, which is followed by gradually increasing dyspnoea and later by suffocative exacerbations that may require tracheotomy. Krieg considers the affection most frequent in children and regards it as a basis for attacks of pseudocroup, due to temporary increase of the swelling at night.

Pachydermia of the larynx is a term used to describe dermoid changes of the laryngeal mucosa with thickening of its epithelium which acquires the many, layered and horny character of the cuticle. Hyperplasia of the papillary and sub-papillary connective tissue commonly co-exist. The classic seat of this condition is over the pro-

cessus vocales, but it may occupy any part of the larynx. At the vocal processes it forms the typical pachydermia laryngis of Virchow. At first two small smooth reddish cushions of mucosa are seen, one upon the inner surface of each cord. At its posterior third, as these grow, they force the cords apart and create hoarseness. Gradually the compressing force of the adductor muscles causes one of the prominences to sink into a groove or hollow in the other so that the cords in time may come together again and the hoarseness lessen or almost disappear. Later the pachydermatous projections become of a yellowish pink color, and the surface becomes cracked and has a warty appearance so that they may resemble papillomata. Pachydermia may extend over the entire cord as a flat white epithelial thickening or as whitish verrucous masses. The inter-arytenoid region is also a common site and the pachydermatous tissue here may form irregular nodes, or whitish warty thickenings, so that in some cases the inter-arytenoid region is filled with tumor-like masses.

Atrophic conditions are comparatively rare in chronic laryngitis. They usually result either from chronic suppurative catarrhs as in laryngitis sicca or from tuberculosis. When atrophied the cords lose their straight and even border and acquire a concave or wavy edge so that they do not approximate well. The false cords shrink and permit a view into the ventricle while the general contour of other portions of the larynx becomes thinned and the voice becomes weak or hoarse.

In laryngitis chronica sicca, blackish or grayish green crusts adhere to the mucous membrane, especially upon the cords or in the inter-arytenoid space; but in severe cases the entire laryngeal interior is coated with dried gummy muco-pus, and the same condition extends to the trachea. When the adherent secretions are removed the mucous membrane appears velvety red but is not much swollen. Below the cords adherent scabs may be seen lining more or less of the trachea and at times even extending to the bifurcation.

Adherent muco-pus in chronic laryngitis often causes the appearance of ulceration and it may need to be removed in order to determine whether the underlying mucosa be intact or not. Paresis of muscles due to chronic laryngis is most apt to affect the arytenoideus transversus and the thyro-arytenoidei muscles; in the former causing a triangular gap behind the tips of the processus vocales when the cords are adducted, and in the latter, resulting in an elliptical shape of the glottis in front of the processus vocales. These muscular changes are often irremediable.

Where the cords lose their function in chronic laryngitis the ventricular bands are made to approximate and take their place, creating a harsh coarse voice.

*Diagnosis.* The diagnosis of chronic laryngitis can not be made without the laryngoscope as the symptoms are not sufficiently characteristic to exclude other affections.

Neglect of laryngoscopy is responsible for the frequent confounding of early carcinoma of the larynx with chronic laryngitis, because for months, or even years, the chief symptom of carcinoma may be merely hoarseness, and as this is the most striking characteristic of chronic laryngitis the two affections may be easily confounded if one relies on the symptoms alone.

Diffuse, smooth, infiltrative forms of carcinoma may for a time resemble the hypertrophies of chronic laryngitis, but the usual unilateral seat and congestion of carcinoma are in contrast with the diffuse hyperæmia and symmetrical location of the swellings in most cases of chronic laryngitis. Carcinoma often causes fixation or impaired motion of one cord. The impairment of motion due to chronic laryngitis commonly is bilateral, never complete, and it is generally due to obvious mechanical hindrances caused by swellings or hypertrophies. Fixation of the arytenoids does not occur in chronic catarrhal laryngitis but it is often symptomatic of carcinoma.

The typical prominences of pachydermia may appear like the papillary form of early carcinoma but they are found upon the processus vocales which are almost never the seat of carcinoma. They are bilateral while carcinoma is in the beginning unilateral.

White, pachydermatous, horny excrescences in other than the usual location may resemble the warty forms of carcinoma and need the microscope for diagnosis. The later stages of carcinoma with characteristic pain, ulceration and exuberant growth can not be confounded with chronic laryngitis which produces nothing that would appear like a neoplasm and gives rise merely to erosions and not to ulcers.

The irritation of tubercular sub-mucus infiltration may create chronic inflammatory states that from inspection alone cannot be distinguished from the hypertrophies of chronic laryngitis. This is especially true of the inter-arytenoid region where pachydermatous thickening may have tuberculosis as a basis. In these doubtful cases the diagnosis must be made by the exclusion of the signs and symptoms of tuberculosis elsewhere and by observation of the case. The lungs should be examined and the temperature watched in all cases of chronic laryngitis; but it should be remembered that a temperature of 99.5° F. is not uncommon in simple catarrhal inflammation of the larynx and trachea and the latter is often involved in chronic

laryngitis. In the regular forms of tubercular laryngitis the laryngoscopic image is sufficiently characteristic to warrant a diagnosis at sight. The typical paleness of the mucosa in tuberculosis, the cedematous pyriform swellings of the aryteno-epiglottic folds, the thickened immovable epiglottis and the ragged, ill defined ulcers with fungous granulations are unmistakably tubercular, and almost invariably associated with pulmonary tuberculosis. In the non-infiltrative forms of laryngeal tuberculosis the destructive ulceration of the cords and proliferations of the granulating ulcers in the inter-arytenoid region are unlike the deforming, but not destructive changes of chronic laryngitis. A daily temperature elevation of two or three degrees is almost sufficient in doubtful cases to settle the diagnosis in favor of tuberculosis, but an elevation of only one degree is often present in catarrhal inflammation of the larynx and trachea.

Syphilitic laryngeal catarrh occurs about the time of the secondary eruptions. It is chronic, is accompanied by cough, and presents to view general or localized inflammatory congestion and swelling, usually without ulcerations or papules, so that it closely resembles simple chronic laryngitis and is often mistaken for the latter, until other secondary symptoms or ulceration make the matter clear. Erosions following papules upon the cords or in the inter-arytenoid region may also be confounded with those of laryngitis. Gumma of the larynx is very rare, is usually single and unilateral in its location, but it may be multiple and looks like a smooth, red, hemispherical neoplasm rather than like an inflammatory product. When it acquires a yellow centre or break down it becomes too characteristic for error. The deep ulcerations and cicatricial formations of later syphilis do not resemble chronic catarrhal laryngitis. Syphilitic non-ulcerating, diffuse infiltration is usually unilateral or localized while the rest of the larynx is intact; chronic catarrhal laryngitis is generally symmetrical in location, and commonly evenly involves the interior of the larynx. Anti-syphilitic remedies may be needed to make the diagnosis clear.

The characteristic immobility of the cords combined with the otherwise normal appearance of the parts of the larynx suffice to distinguish the various laryngeal paralyses from chronic laryngitis.

*Prognosis.* Even the milder cases of this disease may prove intractable or be capable of only slight improvement, though they may usually be cured by suitable treatment in a few weeks or months.

The swellings of the mucous membrane due to inflammatory cedema or infiltration will recede under proper treatment but the organized connective tissue of the hypertrophic states will remain.

Atrophy is also irremediable, though the dry form of laryngo-tracheitis that sometimes causes it, is capable of great improvement or recovery.

Pachydermia over the vocal processes may disappear if it be treated in its beginning but if well developed, it is generally permanent.

No treatment seems of much value where softening of the cords has occurred, and paretic states of the laryngeal muscles developed in the course of chronic laryngitis are usually lasting. Chronic laryngitis associated with pulmonary tuberculosis is sometimes capable of a good deal of improvement, though usually the constitutional disease must improve before we can hope for betterment of the larynx.

Where chronic laryngitis is manifestly superficial and practically limited to congestion and excess of secretion, it offers the best outlook, especially if the cause, such as nasal obstruction or voice abuse be removable. The prognosis is better in robust people and in those of good habits than in delicate persons and those of irregular life.

*Treatment.* Treatment will be of little use or it will be followed by constant relapses, unless the causes of the disease be removed. When nasal obstructions, such a hypertrophic or intumescent rhinitis, serious septal deflections or spurs, etc., exist, these should be removed in the beginning of the treatment, for applications to the larynx alone can scarcely cause permanent benefit. I think that from 80% to 90% of all the cases of catarrhal laryngitis that I see result from nasal obstruction or are at least kept up by that condition. In these the nasal trouble must be removed in order to cure the larynx. It appears also that the intermittent obstruction, occurring especially at night, due to intumescent rhinitis is a more important etiological factor than any other. Septal deflections and spurs that do not materially reduce the calibre of the naris should not be looked upon as causative factors and should not be removed. The more permanent obstructions, as for example mucous polypi, that cause continuous mouth breathing, appear to have less effect on the larynx, which seems to habituate itself to the constant irritation; but in these cases also appropriate nasal treatment should be carried out. Chronic naso-pharyngeal catarrhs must receive simultaneous attention. The patient must also be carefully examined for underlying affections such as diabetes, tuberculosis, Bright's disease or digestive disorders, which must receive appropriate treatment in order to cure the local affection; therefore, a general knowledge of medicine is necessary to fit one to treat chronic laryngitis.

Patients who work in a dusty atmosphere would be benefited by wearing a respiratory but they can seldom be persuaded to do so.

In the simpler hyperæmic types of the disease, voice rest is of great importance. The patients should be told to speak but little, to avoid singing and talk only in a low voice. Complete rest for the cords may be obtained if the patient can be induced to whisper only. Though voice rest has a favorable effect upon inflammatory œdema and hyperæmia it will not benefit the permanent hypertrophies or atrophic conditions, therefore where these after effects of inflammation are much in evidence it will not help the patient to spare his voice. After removing the nasal causes, in the treatment of chronic laryngitis, and its common associate chronic tracheitis, regular frequently repeated and persistent topical applications of stimulant, antiseptic or alterative remedies are very important.

The various substances used for this purpose may be applied in the form of powders, sprays, pigments or inhalants. Sprays are preferable, though occasionally powders are of service, and sometimes pigments applied by means of a cotton probang are effectual. These applications should be made every day for one or two weeks, until acute congestion has been excited; then once in two days for a week or two, and after this less frequently, according to the improvement; at the same time the patient may himself use weaker applications by sprays or inhalation each morning and evening, or a small pocket inhaler may be employed, wherewith applications may be made several times a day. Different larynges vary exceedingly in sensitiveness, so that an application which will cause no discomfort whatever in one, may in another produce extreme pain. It is therefore necessary to try weak medication at first, and to gradually increase the strength of the remedies used. It is seldom practicable for these patients to visit the physician as often as such applications are necessary and rarely do we find patients who can make thorough applications to the larynx, or any application at all to the trachea, with atomizers, however good the instruments. Usually the physician can not see these patients more than once or twice a week. At these visits he should make some stimulating or astringent application of sufficient strength to cause discomfort for one or two hours, the particular remedy being of much less importance than the stimulation (measured by the amount of discomfort) that it produces. In the interim between these treatments, I have long directed the patient to use two or three times a day some application, generally with an atomizer, to the larynx with the endeavor to get some of it into the trachea. Aqueous solutions have been commonly employed but very little if any of these can be taken into the trachea. Oily solutions of thymol, menthol, iodine, terebene, eucalyptol, etc., when applied with an atomizer or nebulizer may be more readily inhaled; but commonly as employed by the patient, they have little effect, because so

little is deposited on the mucous membrane that the action is very transient and because the applications are not made often enough. For several years I have employed with good effects a small pocket inhaler known as the Gale & Blocki (or shorter the G & B) inhaler which the patient is urged to use every two or three hours during the day. This inhaler consists of a short hard rubber tube, the ends of which when not in use are closed by hard rubber caps that screw in. The inhaler is 3 inches long and  $\frac{5}{8}$  inches in diameter. It is packed with blotting paper which absorbs the medicament. Each morning, the patient is directed to drop into it five or ten minims of some stimulating solution such as given below and from this he is to inhale every two or three hours during the day by removing both stoppers and inhaling deeply two to eight times or sufficiently so that he will feel the effects in the larynx and trachea for five minutes. The following solutions I have used most:

R Formaline  $\bar{5}$   $\frac{1}{4}$ , Menthol  $\bar{5}$   $\frac{1}{2}$ , Tr. Iodine  $\bar{5}$  ii, Alcohol, ad.  $\bar{5}$  i.

R Formaline  $\bar{5}$   $\frac{1}{2}$ , Menthol  $\bar{5}$   $\frac{1}{2}$ , Tr. Iodine  $\bar{5}$  iv, Alcohol, ad.  $\bar{5}$  i.

R Thymol grs. iii, Menthol grs. xxx, Tr. Iodine  $\bar{5}$  i.

This plan has given satisfaction but I have found difficulty in getting sufficiently strong effects on the larynx and trachea, and I have often been disappointed by finding the patient unable to obtain an effect that he could feel for more than half a minute. Lately I have adopted another plan with the same instrument that promises to be more satisfactory and which enables me to get any desired degree of stimulation, the patient being directed to inhale just long enough to feel the effects for five or ten minutes as observation proves most efficient. With this method the druggist removes the blotting paper packing and cuts away about  $\frac{3}{4}$  of an inch from its middle then he reintroduces one part of the packing into one end of the tube. He then puts in Menthol gr.x, Iodine crystals gr.v and on top of it gr.x more of menthol. The end of the inhaler is then packed with the remaining piece of blotting paper and the instrument is charged so that it will last several weeks.

In chronic laryngitis, it is often important to improve the patient's general nutrition by the employment of tonics and occasionally Ext. of Hyoscyamus in doses of gr.ss to gr.i three or four times a day or other remedies as needed to quiet irritating cough. Bromide of ammonium is often a valuable adjuvant in cases where the cough is annoying. Opiates should not be employed excepting in the rarest cases.

The topical remedies commonly employed in this disease consist of zinc sulphate or chloride in solutions varying in strength, from gr.ii to xxx ad  $\bar{5}$  i. of distilled water; alumnol gr.xxx to gr.i ad  $\bar{5}$  i; phedine gr.xxx to gr.Lx ad  $\bar{5}$  i; solutions of iron chloride, m

Lx. to cxx. ad  $\frac{3}{4}$  i; iron and ammonium sulphate, gr. v to xxx ad  $\frac{3}{4}$  i., or copper sulphate, gr.x to xx ad  $\frac{3}{4}$  i; silver nitrate, gr.x to Lx ad  $\frac{3}{4}$  i; tannin, gr.xxx to Lx ad  $\frac{3}{4}$  i. The zinc and copper salts have proved most generally satisfactory in my hands, although the alumnol or phedine often answer well. Usually in the beginning I apply a spray of a solution of zinc sulphate, gr.ii, menthol gr.ss and acid boric gr. vii ad  $\frac{3}{4}$  i., and if this causes no discomfort a small quantity of a solution of zinc sulphate gr.xxx ad  $\frac{3}{4}$  i, is applied immediately afterward, and should no smarting result, a more thorough application of it is made, the aim being to produce a reaction which the patient will feel for one or two hours. I usually make these applications in the form of spray with an air pressure of thirty or forty pounds to the inch.

The substances most commonly used in the larynx in the form of powder are bismuth, boric acid, iodoform, iodol, gum benzoin, myrrh, alum, zinc sulphate, and silver nitrate. Boric acid alone is slightly stimulating, and specially useful when the secretion is excessive. Equal parts of gum benzoin, bismuth, and iodol or iodoform make an excellent powder, still more stimulating. Tannin, in the proportion of from two to ten per cent, with sugar of milk, is sometimes useful. Equal parts of alum and sugar of milk answer well when a decided effect is desired, or alumnol, one part to sugar of milk, 10 or 15 parts may be similarly employed. With most of these powders it is well to combine about two per cent of pulverized starch to prevent packing, and all of them should be thoroughly triturated.

Among the modern local remedies for purulent catarrhal states, protargol has gained a permanent place and it is not less useful in the larynx than elsewhere. It is best to apply it in five to ten per cent solution by means of the spray or in powder of similar strength and it is especially serviceable in the superficial forms of chronic laryngitis with excess of secretion. Its influence on the deeper seated inflammatory swellings and hypertrophies is slight.

When the trachea is affected as well as the larynx or when the ordinary atomizer tip does not carry the spray into the larynx because of close approximation of the epiglottis to the posterior wall of the pharynx, Freer's long intra-tracheal spray tube is a valuable instrument as it may be made to hold the epiglottis forward or to pass between the cords to deliver the spray directly into the wind-pipe. It is especially useful in laryngo-tracheitis sicca. Freer recommends for this condition a solution of potassium permanganate, 8 to 12 grains to the ounce of water, sprayed into the larynx and down the trachea.

Where the laryngeal mucosa has undergone dermoid changes with epithelial and papillary hypertrophy, as in choriditis tuberosa or inter-arytenoid verrucous conditions the milder astringents are ineffective and mildly caustic applications are most useful. As a preliminary to their use the larynx must be anesthetized with a ten per cent solution of cocaine to avoid laryngospasm and permit accuracy of manipulation. Nitrate of silver, from 30 to 100 grains to the ounce of water, may be applied with a small swab by means of a laryngeal applicator, and should only touch the diseased area, and if this be large, only a portion of it at a time.

Chronic acid is an excellent remedy in obstinate cases. A small portion of this should be fused on the end of a guarded applicator with which the part should be accurately touched. The stronger caustic applications cause a good deal of inflammatory reaction and therefore should not be repeated at shorter intervals than a week. Removal of the pachydermatous masses from the vocal processes by means of cutting forceps has proven unsatisfactory and the use of the galvanic cautery, caustics and electrolysis has been attended with only poor success. Fein caused disappearance of the pachydermia by the application with a swab of a solution of salicylic acid 15 grains, water and alcohol each 75 minims. The method is worthy of a trial for all pachydermatous conditions in the larynx. In eversion of the ventricle or where hyperplastic mucosa protrudes from the ventricle it must be cut away. The best instrument for this purpose is the ordinary polypus snare with a long bent tube having a flattened end to hold the loop in proper position or the double curette of Landgraaf and H. Krause, which cuts vertically: Tuberous masses in the inter-arytenoid region, or elephantastic ventricular bands may also be removed by the double curettes, or can be reduced by chromic acid-electrolysis or the galvano-cautery. In some cases the snare may be applicable.

In chronic sub-glottic laryngitis tracheotomy is generally needed in the course of time, and it should precede all vigorous attempts at endo-laryngeal removal of the swellings. The most thorough method of dealing with these is extirpation after laryngotomy.

For the treatment of chronically swollen vocal cords softened by venous dilatations Krause makes small longitudinal incisions three to four millimeters apart, along the cords from the anterior commissure to the processus vocales. The incisions pass through the entire thickness of the vocal cords. He states that in some of his cases, recovery resulted from conditions that had resisted astringents for months.

34 Washington St.

## LARYNGO-TRACHEAL INJECTIONS.\*

BY THOMAS HUBBARD, M.D., TOLEDO, OHIO.

The practice of making laryngo-tracheal injections for the purpose of direct medication was first advocated in a practical and consistent manner, with clinical reports, by Botey of Barcelona in a communication to the Academy of Sciences, Paris, 1890.

The early history of the art is very interesting. In this enlightened age we wonder how men dared to have positive opinions on such obscure anatomical regions as the larynx and trachea. Dr. Horace Green, a man of convictions and ambitious to convince, expressed very positive conclusions concerning the practicability of pulmonary medication by means of a long flexible tracheal tube. This led to the "Bronchial War" on Manhattan Island. It lasted with remissions from 1847 to about 1854, a seven years war in the wilderness as it were, for the laryngoscope had not then dispelled the mists of confusion. The New York Academy of Medicine gave this unique exhibition in medical polemics. Again and again incredulity demanded clinical demonstrations. After several failures the redoubtable Dr. Green proved to the special jury appointed that it was possible to pass the tube into the trachea. A lighted candle placed near the end of the tube was extinguished, and a toy balloon was inflated, to demonstrate that the tube was in the air passage and not in the esophagus. A solution of silver nitrate was injected into the bronchi and the subjects survived. The controversy was taken up by the daily press, thus prejudicing the profession, and in the end the honor due to Dr. Green seems to have been ethically assigned to a half century of oblivion. There is no doubt but that in selected cases much benefit was derived from this method of treatment, but the pathology of pulmonary diseases was so obscure that no definite conclusions could be drawn.

The question was finally settled by the Academy in a thoroughly judicial manner—the jury disagreed. The verdict of the minority of one is prophetic: "The results of this method of treatment, whether it has been employed in bronchial affections or in the com-

\* Read at the Twenty-sixth Annual Meeting of the American Laryngological Association, Atlantic City, N. J., June 2, 3 and 4, 1904.

mencement of tuberculosis, have already afforded the most gratifying indications that practical medicine will be greatly advanced by the discovery." (Signed)

FORDYCE BARKER.

In his state of ethical retirement Dr. Green was in excellent company, for Morton was then under the ban of professional disrepute for attempting to patent the process for making sulphuric ether.

It is somewhat remarkable that, in reviewing the foreign literature on this subject, one finds no mention of these very ingenious experiments of Dr. Green's. To him undoubtedly is due a great honor. His published clinical results merited attention, but unfortunately he made no distinction between tuberculosis and more readily curable bronchial diseases, and as we can understand in the light of modern pathology, his claims were beyond reason.

The invention of the laryngoscope directed attention to study of the larynx and upper respiratory tract, and even locally the teachings of Dr. Green and his allies seem to have been lost sight of. Now that diseases of the nose and throat seem well understood, we go back half a century and develop the method so courageously advocated by Green.

Direct tracheal medication by means of injections was undoubtedly practiced by many prior to the publication of Botey's paper in 1890. There are a half score of claims to invention. Garel and Dor were working along this line in 1888. Bechay and Rosenberg published in 1889. Bichat and Colin experimented in tracheal absorption, and Heryng, Bronner, Sendziak, St. Hilaire and others were using the method contemporaneously with Botey. Mendel improved the technique and published results of treatment with various combinations of medicaments. He awards the claim of priority to Botey, and after having contributed much toward developing his method and defining its limitations he proceeds to throw the whole matter into confusion by promulgating his so-called "going it blind" method.

This seems to be simply an attempt to half drown the patient by injecting with force against the post-pharyngeal wall medicated fluid enough so that some of it must spatter into or overflow into the larynx. The object is commendable—that is, to make it practical for patients to administer treatments to themselves, but it is a bungling method, and scarcely worthy of the prolonged controversy it stirred up. In 1901 Rosenthal and Weill revived the suggestion of Dubois, that of injecting through the anterior tracheal wall by a specially devised syringe and canula.

These incidents in the evolution of the method are mentioned chiefly to impress the fact that the literature of tracheal injections is full of absurd and impractical experiments. The practical clinician has been rather repelled than attracted. The impression has been cultivated that tracheal medication is a specialty within a specialty. The meagreness of text-book literature which we in America regard authoritative gives the impression that the method of Botey has not been adopted as a routine practice by laryngologists in general. It is only by familiarity with the practice that one can appreciate its superiority over other methods in common use.

Prominent among American writers who have advocated the method and enlarged its field of practical application are: Thompson, Murray, Anderson, Simpson and Donellan. Thompson administers tracheal injections in a variety of pulmonary diseases, including even broncho-pneumonia, bronchitis with emphysema, chronic bronchitis, bronchiectasia and tuberculous bronchitis and laryngitis.

My own experience of about four years impresses more decided limitations. Thompson and others admit that injections do no good, and may even do harm, during the acute hyperemic stage of any type of inflammation. In a severe bronchitis involving the whole bronchial tract it is a matter of clinical observation that a part may have reached the stage of resolution and yet another portion of the tract be in the active inflammatory state, so that the mere fact that a patient with more or less extensive bronchitis is expectorating freely is not an indication that injections may be practiced. One must wait until the stage of invasion has passed and acute febrile reaction subsided and until the general systemic condition is favorable to recovery before beginning this treatment, and then in reality it is simply the residual bronchitis, caused in part by the accumulation of more or less irritating secretions, that the treatment aims to relieve. In ordinary bronchial affections I would say that properly administered tracheal injections take the place of so-called stimulating expectorants, and during the period of convalescence from acute bronchitis the recuperative power of the patient is decidedly fortified and nutrition favored by relieving the gastro-intestinal tract from the disturbing influence of cough sedatives and expectorants in syrups *ad nauseam*.

Anderson has published the results of very important experiments bearing on bronchial absorption. Olive oil is quite rapidly taken up by the glands and can readily be detected in the parenchyma soon after injection. Alkaloids manifest their physiological effects very promptly, and iodine can be detected in the urine when injected in an oil menstruum. Many of these physiological data have long been accepted, and it seems to me have little bearing on the merits of the

question in so far as ordinary acute affections are concerned. Tracheal injections are not given for the purpose of any degree of systemic medication. Absorption is not the object. The treatment is essentially local. The purpose is to encourage free secretion of sero-mucus and further to prevent the fermentation or decomposition of accumulated deposits and production of catarrhal sapremia. Oil is the best menstruum because it is non-irritant and the medicament can be retained longer in contact with the nerve filaments irritated by the acrid secretions or in mixture with accumulated muco-purulent deposit to prevent decomposition.

This is emphasized by the fact that of all medicaments proposed guaiacol and menthol in one to three per cent. solutions are acknowledged to be the best. The former is a readily volatilized and diffusable antiseptic and stimulates a sero-mucus flow, and the menthol lessens nerve irritability.

Anderson has had excellent results in bronchial asthma, and my experience is decidedly corroborative. In so far as chronic bronchitis is a factor, the tracheal injection is almost specific in its effect. To be sure, in this class of cases we are confronted by peculiar idiosyncrasies and it must be understood that the classical general treatment cannot be supplanted by merely local medication. In fact, all things considered—the neurotic element and the chronicity of these cases—I would place tracheal injections as very useful adjuvants to the general treatment of bronchial asthma.

This method of treatment is especially applicable to fetid bronchitis, bronchiectasia, and also to the treatment of bad breath of pulmonary origin, a condition dependent upon vicarious gaseous elimination rather than a definite lesion.

Murray, Barton and others advocate tracheal injections in tuberculosis, believing that positive curative results are obtained in incipient cases, and it is Barton's practice to instruct patients in the art, so that by the aid of a mirror they can practice injection daily. With others, he emphasizes the point that laryngeal manifestations of the disease are inhibited or prevented. It is not my purpose to dwell particularly on the application of this method to the treatment of tuberculosis. Dr. Murray has recently contributed his favoring experience to the society; but I would emphasize the point that tracheal injections are of undoubted utility in alleviating the distressing cough and laryngo-tracheal irritation, and in a measure preventing laryngeal erosions.

The technique of tracheal injections has not been materially altered from that described by Botey. The long curved laryngeal canula attached to the Muir syringe of about 8 c. cm. (2 drams) capacity

seems to be the favorite. Donnellan uses a canula having lateral perforations near the tip to irrigate all parts of the trachea. Most operators use cocaine anesthesia prior to injections as a routine practice. There are certain subjects not amenable to this method, throat and larynx being so uncontrollable that the trachea can be reached only by prolonged effort. They are rare, and in skillful hands the majority can be treated with ease and without subsequent discomfort. Following the treatment there is more or less coughing, but if a suitable quantity has been injected, this seems to me an advantage. It serves to churn the oil with accumulated secretions and exposes more membrane to its effects. The deep inhalations carry the healing and sedative medicaments, volatilized by the warmth of the bronchi, deeper into the bronchioles. One can test the efficacy of the medication by observing the cloud of vapor with each expulsive cough, and this is often visible some time after the injection. Patients frequently state that they can taste or smell the guaiacol on coughing for six or even twelve hours after treatment.

For two years I have used a modified canula. In all cases where the vocal cords can be seen in the mirror I have found it easy to inject the fluid from a canula having about a half-inch bend—not long enough to reach below the tip of the epiglottis. A few drops of guaiacol-menthol solution in the larynx gives sufficient anesthesia, so that on a second trial the desired amount, one-half to two drams or more, as indicated, can be dropped directly into the trachea. It is frequently possible to so tilt the patient to right or left that the fluid can be allowed to flow down the left or right wall and into either main bronchus. The sensation of slight irritation is located by the patient over right or left bronchus. Occasionally it is necessary to use the long canula inserted to the glottis, but as a routine practice this is neither desirable nor necessary.

Besides the various types of bronchitis amenable to this treatment I would add that I have found it very useful in laryngitis, excepting, of course, the acute hyperemic state. It is astonishing how tolerant the larynx is when the warm medicated oil is dropped directly into it, and I have found that even a watery solution of argyrol is tolerated. As compared with the swab or spray the efficiency of this method seems to me superior. Sub-glottic inflammation, subacute, acute and chronic, and especially that type associated with lithemia, is more satisfactorily treated by this method than by any other with which I have had experience.

Concerning the medicament used, there is decided unanimity in choice. Leaving tuberculosis out of the question and considering only the ordinary types of laryngitis, tracheitis and bronchitis, the

solutions required are few and of well-known efficiency in affections of mucous membranes. A bland oil, sterile of course, is the menstruum. The majority prefer fresh olive oil, but an absolutely pure petroleum oil is probably equally good, and in some respects more desirable than the vegetable oil. Most of the petroleum oils on the market have been treated by chemicals in process of refining and are more or less irritating. There is a chemically pure Russian oil, which is the product of fractional distillation and is non-irritating. Anyone can make the test of purity by adding iodine crystals to the oil. The chemically refined oil will oxidize or reduce the iodine, producing a colorless solution in a short time but the iodine color will be retained in the chemically pure oil indefinitely. It can also be demonstrated by the starch test.\*

With iodoform I have had no experience, but have no doubt that in some cases it is indicated.

## FORMULA.

Menthol in olive or C. P. petroleum oil..	1 to 3 per cent.
Guaiacol " " " " " ..	1 to 2 per cent.
Iodine " " " " " ..	pink.
Argyrol in water.....	10 to 25 per cent.

## MENDEL'S FORMULA.

Iodoform	
Guaiacol	
Essence thyme	
" cinnamon	
" eucalyptus .....	a a 5
Olive oil.....	100

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\* One decided advantage of chemically pure petroleum oil as a menstruum is that it never becomes rancid and corrosive to the metal canula, as does olive oil. This greatly simplifies the question of care of the syringe and permanence of prepared solutions.

## DISCUSSION.

Dr. J. W. GLEITSMANN said that he had intended to read a paper upon this subject before the Laryngological Section of the American Medical Association, but was prevented. He agreed with Dr. Hubbard in his statement that the subject is covered by a large amount of literature. He went over it and found about seventy or eighty references, quite a number of which Dr. Hubbard had mentioned in his paper. The majority of the writers, and it is thought also the men who use the medication at present, agree that it does some good, and in selected cases is often most satisfactory. With regard to the application of the remedy, Dr. Gleitsmann stated that he is not able with certainty to inject a sufficient quantity of the liquid oil into the trachea without a laryngeal mirror. He did not think there is any possibility of introducing the long canula, which he thinks necessary, below the cords and into the trachea without the aid of a mirror, although a certain amount of the liquid may be injected into the larynx very easily without the aid of a mirror. For this purpose it was suggested that the patient should inhale deeply, and during the moment of inhalation the liquid should be put down. Dr. Gleitsmann was not satisfied, however, with the small amount applied in this manner, and generally used about from one to two ounces. In the beginning of the treatment he used Hartwell's laryngeal syringe, holding about a dram.\* He had seen many good results and great improvements. He had used it in many cases of long-standing cough, not due to anything but an extensive cold or bronchitis. One such case was relieved permanently and in the other considerable improvement took place during the time of treatment, but the old condition had returned. He used *benzoinol* and menthol, with or without one per cent. guaiacol. He had also used this preparation with small quantities of camphor, but thought it best to leave it out, as he found it set up an irritation. He now confined himself to *benzoinol* and menthol, which had proved very satisfactory, the patients seeming to have invariably improved.

Dr. W. K. SIMPSON believed that in intra-tracheal injection was found one of the most positive means of both local and constitutional effect upon bronchial and pulmonary conditions, and that the time was coming when it would be a very popular mode of treatment. There were, however, quite a number of things about its use which must be considered. It was not so satisfactory until one became very familiar with it; a considerable amount of technique was required.

\* Later on a Hartmann's syringe with hard rubber canulas of his own device and of different curvature (demonstrated to the Association.)

He had used it many times, but thought it best to precede its employment with local anesthesia produced by cocaine administered in spray to the larynx, one-half of one per cent. being sufficient. He also considered that it was absolutely impossible to use the tracheal syringe without the use of the mirror; in fact, he did not think it possible to do anything of an intra-laryngeal nature without the aid of the mirror. He had always used the long syringe, because his experience had been that if one could get the nozzle of the syringe between the cords and a spasm occurred the syringe would already be in the trachea and one could keep on with the injection. With a small trachea a spasm would cause its closure, and the fluid would not enter as well as into a large trachea. He thought that when patients were not accustomed to the use of the intra-tracheal syringe, it was apt to bring about a spasm. Another question presenting itself was whether there was any danger other than the temporary spasm produced in certain cases. He mentioned one instance in which pneumonia followed the use of the syringe. The patient was a very robust man who had a cough, pure and simple, of a spasmodic nature. It was difficult to make a diagnosis in this case, the cough yielding to no form of treatment. The intra-tracheal injections were finally tried, but after three or four weeks, the patient developed a pneumonia. It was Dr. Simpson's opinion, however, that this mode of treatment had in many conditions of the bronchial tract a very decided value.

Dr. EMIL MAYER thought that sufficient stress had not been laid upon the temperature of the injected fluid. It was important that the temperature of the fluid should be warm, and Dr. Mayer thinks that when the fluid was injected into the throat it should be of the same temperature as that organ.

Dr. J. E. RHODES stated that it was possible to use a ten per cent. solution of menthol in tracheal applications, and did not understand why a one or two per cent. solution only was advised.

Dr. JOHN O. ROE suggested the use of chloroform for the purpose of relieving the irritability of the throat in making the intra-tracheal injections, and considered it a far better agent for this purpose than cocaine. More or less irritation of the larynx, frequently attended by laryngeal spasm, was almost always caused by the application to the larynx, particularly of irritating substances, like nitrate of silver. If, however, a few drops of chloroform were inhaled until the patient begins to feel the effects of it slightly, the application could be made with the greatest ease and cause the patient no disturbance. By this

means, the use of cocaine, or other local anesthetics, was entirely unnecessary, and they could not fail to have an undesirable effect. Those who had never tried this method of temporarily obtunding laryngeal sensitiveness to the introduction of instruments or irritating remedies, would, he was sure, find it of special service.

Dr. G. HUDSON MAKUEN stated that he had owned an intra-tracheal syringe for fourteen or fifteen years, but has used it only occasionally. He made it a rule never to use on his patients anything which he would object to have used upon himself, and he doubted if he should care to have an intra-tracheal injection made to his throat. However, he believed that if one could avoid touching the epiglottis, spasm would not be produced. He then referred to a device presented by Dr. Freer, of Chicago, before the Section on Otology and Laryngology of the American Medical Association some years ago. It was a little canula which he had fitted to the tip of the Davidson atomizer. These canulæ were of different lengths, and by the aid of compressed air the tip could be made to reach a little below the chink of the glottis, and it was then possible to spray directly into the trachea while the patient inhaled long and deeply. Dr. Makuen used this in cases where he was unable to use the syringe, and had been able to keep it up for from 30 to 60 seconds, and thus spray into the trachea a dram or more of oil. This was not regurgitated, but taken down into the trachea and bronchial tubes, and was tasted in the mouth for hours afterwards. Dr. Makuen considered it a rather better device in some cases than the intra-tracheal syringe. He inquired why if this method of treatment were good in chronic cases, it was not also applicable to acute cases?

Dr. J. L. GOODALE agreed with Dr. Roe that the use of cocaine for the purpose of producing a local anesthesia in patients where frequent treatment is necessary, was to be deprecated. There was a combination which he had used, viz., a combination of a saturated solution of eucain B. with a little adrenalin. By adding to a saturated solution of eucain B. a few drops of adrenalin chloride in 1-1000 solution one has a very excellent local anesthetic, nearly equalling cocaine in the completeness and rapidity of its action.

Dr. HUBBARD (closing) said he had had little experience in producing constitutional effects, as suggested by Dr. Simpson, and in tuberculosis considers the treatment chiefly applicable for relief of distressing bronchitis. He thought the question of anesthesia of the larynx is of small importance, because in using the short curved canula the tip does not even touch the epiglottis, and properly directed one can inject

fluid into the trachea in all cases where one is able to see the glottis or below it. He found that injection during short quick breathing was better in some cases than attempting to inject the fluid during prolonged inspirations. In regard to the case mentioned by Dr. Simpson he did not consider the employment of intra-tracheal injections justifiable in any case unless there is positive indication for it. He at first made an effort to have the temperature of the injected fluid about that of the body, but in subsequent use he has not paid so much attention to this, as it seems unnecessary. In answer to Dr. Rhodes' inquiry regarding the use of ten per cent. solution of menthol injected into the trachea, it must be remembered that with the temperature of the trachea there is an immediate vaporization of the menthol, and one therefore gets a much more pronounced effect than when applying it to the throat. With regard to Dr. Makuen's statement that he uses on his patients only what he would have used on himself, Dr. Hubbard stated he became a convert to this method because he used it on himself. After severe attacks of bronchitis, he found that he could, by the aid of a hand-mirror, inject one dram or more of the solution directly into the trachea, and he is sure that anyone would become a convert to the method if he could experience the immediate relief resulting from such injections. In regard to the question, that if it is not advisable to use this treatment in acute cases, why should it be used in chronic cases, Dr. Hubbard was convinced that quite frequently more harm than good is done by the making of applications directly to the acutely inflamed mucous membrane, either of the nares, throat or trachea. As stated in the paper, tracheal injections of gaiacol and menthol oil solutions may advantageously be used instead of the ordinary stimulating expectorant mixtures, and certainly this class of expectorants are never indicated in the primary stage of acute bronchitis.

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**A Series of Mounted Tuningforks as a Universal Means of Measuring the Absolute Hearing Power**—PAUL OSTMANN—  
*Arch. f. Ohrenh., Leipzig, July, 1904.*

The author describes his standard tuning fork, which is mounted upon a heavy stand, furnished with head rests for patient and physician, and a diaphragm for occluding the sound. Each tuning fork is accompanied by a correction table, by which the observations are correlated to the original standard.

YANKAUER.

## SOCIETY PROCEEDINGS.

### NEW YORK ACADEMY OF MEDICINE.

#### SECTION ON LARYNGOLOGY AND RHINOLOGY.

*Stated Meeting, Held December 28, 1904.*

FRANCIS J. QUINLAN, M.D., Chairman.

#### PRESENTATION OF CASES.

#### **A Case of Malignant Tumor of the Tonsil Treated with Radium.**

Dr. W. FREUDENTHAL presented this case. He said that the patient came to him about six weeks ago complaining of pain in the throat and at the same time he had an ankylosis of the right arm with swelling in the elbow joint and neighboring parts. The whole process seemed to indicate a syphilitic origin, and he was given salicylates and iodide of potash. The elbow joint improved quickly and has not bothered him since, but not being sure of the diagnosis Dr. Freudenthal presented the case to a medical society and found that the patient had been to see several physicians and that one had diagnosed the case as malignant tumor and treated it as such. At that time the tumor could not be operated upon, being too far advanced. The patient refused to permit a piece of the growth to be removed for microscopic examination, and under the circumstances Dr. Freudenthal thought it best to try treatment by radium. He secured 10 millegrammes of radium of one million radio activity and applied it in a small tube which could be screwed on to the end of a probe. Dr. Freudenthal showed a probe with the tube attached, and stated that it could be applied in the larynx in any way desired, as the probe could be bent at any angle. The effect of this treatment was remarkable. After only a few sittings the tumor commenced to grow, and since then it has grown steadily so that it has spread over the inferior maxilla, over a large part of the soft and hard palate and the man suffers a great deal from pain. The only thing now that relieves the pain is orthoform powder.

Dr. Freudenthal also referred to another case which he had shown to some of the members. This was a case of *tubercular laryngitis*

with a swelling of the left vocal cord and a slight inter-arytenoid swelling. Here too, after a very few applications of the radium the mass began to grow so that the whole posterior wall of the larynx presented an edematous swelling, much more marked than at the beginning. The probe with the radium had been introduced into the larynx in a way similar to that used in the other case. Dr. Freudenthal said that he had no knowledge of how others used the radium but that this seemed to him the simplest way. He said that in this case while the growth continued to increase in size under the radium treatment, the left ventricular band grew smaller and now seemed normal. The patient had been suffering from pain in the throat, but this as well as an uncomfortable feeling of pressure had been relieved entirely.

Dr. Freudenthal also referred to another case of tubercular laryngitis in which the effect of radium treatment had been very remarkable. After a few sittings the entire mass began to grow and increased to such a degree that dyspnoea set in. Dr. Freudenthal said that he could not explain these results, though he had seen them repeatedly. Radium was certainly a highly interesting substance and its effect upon pathological conditions in the human body would undoubtedly be found out later.

#### DISCUSSION.

Dr. COAKLEY said that he had seen this patient at his clinic about 5 weeks ago, and at that time took out a piece of the ulcerated area on the soft palate and sent it to the Carnegie Laboratory for examination. A very rapidly growing epithelioma was reported. He tried to get hold of the patient later for Dr. Piffard, that he might try his new treatment on an inoperable case. Dr. Coakley did not use radium, but he did not think it was fair to lay the progress in this case to the stimulating action of the radium. The previous history of the patient indicated an exceedingly rapid growth before Dr. Coakley saw him. If the progress had been anything like as rapid in the four or five weeks following, the man's condition was to be expected in spite of treatment.

Dr. HURD had seen Dr. Freudenthal's case last August in the clinic. At that time it involved the tonsil and the tongue. He thought it an inoperable case of carcinoma and sent it away.

Dr. FREUDENTHAL said that he would continue using the radium for a time, as he had been told that after these tumors commence to grow they break down, and then improvement can be expected.

**A Case of Primary Epithelioma of the Uvula.—Two Recurrences After Removal.**

Dr. HARMON SMITH presented this patient. He was a man of 51 years of age, a cooper by trade, who had been a great pipe smoker. He came to the Manhattan Eye and Ear Hospital on June 13th suffering from difficulty in swallowing and laryngeal irritation. There was no tuberculous or syphilitic history. The irritation was low down in the larynx. Examination showed a tumor involving the uvula, very much like a strawberry in appearance, with a yellow exudate on the surface. Induration, and thickening of the soft palate extended to the right side. No glandular involvement was found on the right side, but in the left sub-maxillary region there was a large gland which the patient claimed had existed for 20 years, and which apparently had no connection with the tumor or its extension. Clinical observation led to the conclusion that it was epithelioma, and it was decided to operate. On June 20th a specimen was taken for examination by frozen section, and the diagnosis was confirmed. At the time of the operation extensive hæmorrhage occurred, which was finally controlled by ligating sections around line of incision. The border of the wound healed and the patient picked up considerably, and the result of the operation was considered favorable. On the 20th of July, however, some redness was noticed on the right border of the wound, and it was deemed wise to make another incision, and cut this out. No difficulty was experienced with hæmorrhage this time, for the ligating was done at the onset. From that time the patient gained 30 pounds, improved in spirits, seemed relieved of his condition, and got along nicely until November 1, when a little red spot, the size of an apple seed, was noticed in the angle of the soft palate, and on this being touched he experienced considerable discomfort. The pain was always referred to the larynx and was apparently reflex in character. On December 2nd, another operation was performed and an incision of such wide extent was made that it was impossible to coapt the edges of the wound and a U-shaped cavity was left. Since then the patient has picked up again and has no thickening in the throat and no pain in the larynx. The gland in the sub-maxillary region was removed at this time; but the pathologist reported that it was not malignantly involved, being only a chronically inflamed gland.

The interesting points in regard to such cases are the rarity of primary epithelioma of the uvula, only five or six cases being reported in the last ten years; the non-rapidity with which it extends, involving the muciparous glands rather than the lymphatics; and the

comparatively early age at which they occur. One case was reported at 37 years, another at 42, and one at 48. This man was only 51. Dr. Oppenheimer of this city had a case in a man of 81, which is the oldest on record.

If a recurrence should take place in this case later, the question would arise as to what could be done. At present the incision reaches to the pharyngeal wall on the right side and considerably to the left. Radium, the ultra violet ray, and the new ray of high frequency current with which Dr. Piffard is experimenting, are all to be considered. The last mentioned could be applied easily for the application can be made with an instrument which comes in direct contact with the tumor, the other tissues being protected by a glass tube. This method might be efficacious if the operation does not prove successful.

Dr. Smith said that he wished to add that he expected to try the high frequency current of Piffard or the ultra violet ray on this patient in case of a recurrence, as he thought it would be a valuable case to try it on because of its accessibility.

**A Case of Extensive Syphilitic Necrosis of the Superior Maxilla, Ethmoid, and Sphenoid Bones.**

Dr. LEE M. HURD presented this patient who had had a primary lesion less than 18 months ago, and two months after had throat and skin lesions. He took anti-syphilitic treatment for three months and subsequently noticed nothing until last May when two molar teeth became loose. In June, two incisor teeth fell out, accompanied with a lot of pus and discharge. From then on, he had no treatment until five weeks ago when he came to a member of this section who treated him for five days with large doses of iodide. He grew rapidly worse, his eyes became closed, and he had intense pain, which was the only pain felt in the course of the disease. He says that five weeks ago he had a nasal obstruction. Dr. Hurd operated a month ago removing the entire superior maxilla, except the floor of the orbit, the nasal bone, the anterior wall of sphenoid sinus, the ethmoidal cells, and part of the perpendicular plate of the vomer. He found necrosis everywhere. He cleaned it all out and the patient made a complete recovery. The remaining teeth and hard palate were loose and he peeled that out from the muco-periosteum of the roof of the mouth and used it as a flap which he sewed to the cheek. One of the most interesting points of the case was that, except the last week, the man suffered no pain with a disease of a character so extensive and insidious. He will now probably be all right.

Dr. MAYER said that it was most remarkable and unusual to see such extensive destruction in so short a time. In the presentation of the case he had heard only of the administration of the iodide of potassium but not of any mercurial medication. He would like to know if any such had been given.

Dr. HURD replied that, after the secondary lesion showed, he had received some treatment by the mouth for three months, and again for three weeks when his teeth came out. This was all the treatment he had until the operation. Since then he has taken 120 grains of potassium iodide three times a day.

**A Case of Extensive Paraffin Injection for Deformity Following Frontal Sinus Operation.**

Dr. ROBERT C. MYLES said that this was one of the most objectionable results that he had seen on account of the large cavity which existed. When the patient came to him the disease was so extensive that he at first tried the lower operation, removing the floor; but, on account of the depth of the sinus, he found it necessary to remove all of the anterior wall. He extended the operation down into the nose and removed the ethmoidal cells and the nasal process of the superior maxilla. The antrum was also seriously involved and the median wall beneath the inferior turbinal body was removed. The man had suffered for several years and was willing to stand anything and everything to be relieved. The result naturally was a very extensive deformity. In making paraffin injections in such cases, a source of difficulty is that when the paraffin reaches deep adherent scar tissue it can not lift it up, and in some cases it is necessary to lift up this adhesive tissue with an instrument. He had tried to do this, but so far had not obtained very satisfactory results. He hoped later to be able to lift up the eschar, but was somewhat doubtful of what the consequences would be. The patient had had three or four injections already, but he was a poor man, living in the country so that he could not be kept under close observation. The man made a splendid recovery from the operation, and the result was very satisfactory except in regard to the deformity.

Dr. SMITH said that in the injection of paraffin in large areas of scar tissue, forcing the paraffin under had not proven an entire success, and that where the nourishment was received from the attachment of the bone he hesitated to lift it up and inject paraffin any distance away from the blood supply of the part. He thought that in this case it might be well to inject carefully around the borders but not to try to do the whole thing at one time.

Dr. MYLES (closing) said that he could report scores of cases of almost any variety; but that these were unfavorable cases selected from a great number of favorable classical ones. He had operated upon cases with large frontal sinus deformity with good results. In the case of the first patient, he was a poor man and could not spend much time in being treated, and he wanted a radical operation. Dr. Myles did not consider the Killian operation a complete or radical one, since it left a pus cavity. If one could secure sufficient room for permanent drainage from the frontal sinus into the nose, nearly every diseased cavity would heal without further procedure, but one could not always rely on the patency of this space. Some years ago he operated on a woman with a partial Killian operation. The woman is now perfectly well with the exception of a small cavity beneath the ridge of bone which occasionally discharge a little pus.

#### **A Case of Recurrent Quinsy.**

Dr. MYLES also presented this case. He said that in nearly all those cases where the patients did not get entirely well after the removal of the tonsils, he had found a pocket cavity beyond the base of the tonsil, frequently quite large, sometimes an inch or more in depth. When the tonsil became inflamed, it occluded the outlet and there was an attack of so-called quinsy in twenty-four or thirty-six hours. In this case, the patient had had it several times and the tonsils had been removed, even to the base, and well beneath the pillars; but still there was recurrence. The last time he had an attack I made a large incision through the bucco-palatal wall and passed a threaded needle through the opening and out through the center of the base of the tonsil and pulled the base of the tonsil out and dissected away a circular piece of the wall between the tonsillar space and the cavity. The cavity was so large and so extensive that the pulsation of the carotid artery could be seen. Of course it had been recently inflamed and swollen, but it had a peculiar glassy covering. I requested the pathologist to look for epithelium on that side of the specimen which was the wall of the cystic abscess, but the report was negative. The case is very interesting on account of the complete operation and depth of the cavity.

Dr. COAKLEY. I saw a case of bronchial cleft cyst which might come under this head. The patient had already been operated upon, and the case was reported in the Transactions of the American Laryngological Association. Perhaps the subsequent history will be of interest. The patient came back again this fall for an opening between

the pillars of the fauces. A cutting from the interior showed the epithelium entirely worn away. No other cavity of that size could be in that region.

Dr. MEIERHOF stated that he had had a patient with a peritonsillar abscess which he had treated, on the same principles laid down by Dr. Myles, as a retention abscess which had been allowed to close up, and which renewed the process upon a fresh accession of cold. On the recurrence of the attack he opened the cavity wide and kept it open for nearly a month by means of gauze packing. That has been the last of the attacks.

Dr. LEDERMAN said he had under treatment a case of recurrent peritonsillar abscess in a young lady with a mild rheumatic diathesis, who was very anxious to be cured of the frequent attacks. The tonsil was not very large but where the anterior and posterior pillars come together the supra-tonsillar fossa was occluded. He cut a portion of the tonsil away, leaving this site free, and since then there had been no recurrence, though previously she had had attacks twice a year. When drainage is obstructed in this region, retention frequently occurs, and gives rise to attacks of peritonsillitis.

**A Case of Extensive Frontal Sinus Affection.—Killian Operation.—Recovery.**

Dr. LEWIS A. COFFIN presented this patient who had had as extensive an involvement of all the sinuses as was possible. His antrum was filled with polyps and the ethmoids and frontal sinus were thoroughly diseased. The operation was done, and fortunately for the cosmetic effects the vertical diameter of the frontal sinus was not great. This was the first Killian operation that Dr. Coffin had performed, and the case was presented to the section on account of the extremely gratifying results obtained.

Dr. COAKLEY said that with regard to the original point of incision he thought that much help was to be obtained by the use of radiographs before operating. Where the sinus was small the incision from the roof of the orbit answered very well, but it did not give accessibility to the upper portions of a large sinus. With the aid of radiograph pictures, the sinuses could be outlined so accurately as to determine definitely the proper point of entrance. In this operation the loss was evidently very great, either due to the extensive disease or as the result of the operation. Since the last meeting he had taken quite a number of radiographs which had come out very well indeed, outlining the sinuses very definitely.

Dr. HARRIS said that in his opinion the results showed very clearly the value of the Killian operation in the preservation of the arch. There was not a large frontal sinus and Dr. Coffin had obtained a very good cosmetic effect, but Prof. Killian had obtained good results with large sinuses. He himself had a case last summer with a large sinus and had obtained almost as good a result as Dr. Coffin. He thought that, wherever possible, the arch should be preserved. Wherever this was done better results were obtained, and the necessity of paraffin could be avoided.

Dr. COFFIN said that he was very much pleased with his first Killian operation and hoped to do others, as he has two or three cases now on hand. It certainly seemed that better results must be obtained by the preservation of the arch, thus dividing the opening into two portions. He did not see how paraffin could be injected under the bound-down cicatricial tissue. He had been led to think of the impossibility of such a procedure when elevating the cicatricial tissue about an old sinus wound in order to do a secondary operation. He had found one of Freer's shovel-shaped knives of great service in this procedure and thought it might be used in raising the scar tissue if one wished to inject paraffin.

Dr. QUINLAN said that last summer in Schwartz's clinic at Halle, he had seen a number of operations. The absolute disregard of the supra-orbital ridge was alarming. The operator chiselled and knocked everything away. He saw the cases afterward and the results were remarkably satisfactory, they needed no word of commendation. In a monograph describing the operation, Grunert takes out everything, and the adipose tissue falls into place and accommodates itself. There is not even diplopia in these cases. Dr. Killian's assistant came up to look at the work and said that at Friburg their results were not as good. Some of the sinus cases were unilateral, some bilateral, but the results showed hardly anything of the enormous destruction of bone by the operator. We are still in the infancy of this work and have much to learn, but probably a few years will bring additional light. In many of the cases he had measured, one could hardly see the difference between the two sinuses and the amount of depression afterward. This seemed a very strange thing to narrate here, because the Killian operation seemed to be the ideal one.

Dr. EMIL MAYER inquired about the after treatment of Schwartz's cases. Was the wound immediately closed? Was the drainage through the nose only? In this way only would the perfect results of healing mentioned by Dr. Quinlan be obtained.

Dr. QUINLAN (replying). Yes. They drained through the nose. Dr. Grunert did some cases, and I could see almost everything.

Dr. HARRIS said that he felt sure that Dr. Myles could not have meant just what he said in regard to the Killian operation not being a radical one. He thought that if there was a radical operation which thoroughly obliterated all the diseased tissue it was the Killian operation. The ethmoid cells were entirely removed and drainage into the nose established. The only objection in leaving the arch was the difficulty in removing the floor of the sinus. Certainly in the case in which he operated, the arch did not interfere. He could go over it, around it, everywhere; but it had no possible effect in acting as a retaining pus cavity. He thought that the other gentlemen who had done the operation would bear him out in this opinion.

Dr. COFFIN remarked that Dr. Harris had just expressed his views. He did not think it fair to speak of any zone or bridge of bone left over the frontal sinus as a Killian bridge. There is but one Killian bridge and that is the supra-orbital arch. One principal of Killian is to remove the entire anterior wall of the frontal sinus allowing the soft parts to fall in. He chisels out the floor of the frontal sinus, allowing the adipose tissue to rise and to a certain extent fill in the cavity. If, on the other hand, any other bridge of bone were left, as suggested by Dr. Myles, he should think that a pus cavity might be formed. No one, so far as he knew, removed the entire anterior wall, orbital bridge, and floor of the frontal sinus.

Dr. QUINLAN said that was what was done in the clinic at Halle. What particularly astonished him was that there was little or no diplopia afterward. It hardly seemed possible, but the results spoke for themselves.

#### **A Case of Laryngeal Affection.**

Dr. MEIERHOF presented this case for diagnosis and suggestion. The patient was 20 years of age and was first seen this afternoon. He has complained of hoarseness for three or four months. The history is absolutely negative for syphilitic infection or any other disease that perhaps might have caused the process. Examination of the lungs gave negative results. The case showed enormously developed ventricular bands, and the vocal cords somewhat injected. The inter-arytenoid space is also slightly swollen. The peculiarity of this case, if it should prove to be tuberculous, is the intensely florid appearance of the mucosa. The pale appearance of the mucosa is not necessary, as was formerly thought to be the case, but

if this is a tubercular affection the intense redness is remarkable. If an examination of the sputum should prove negative, the patient would be put upon a course of anti-syphilitic treatment. He was apparently very well nourished and otherwise in good health.

#### **A Case of Foreign Body in the Larynx.**

Dr. COAKLEY described a case of a patient for whom he had been called to remove a coin from the larynx. The patient was a Swedish woman with a medium sized larynx. He was told that the coin was below the vocal cords and had been there four days. At first he did not think this possible, but he found the coin situated vertically in the median line antero-posteriorly, in the larynx and below the vocal cords. After cocainizing the upper portion of the larynx he passed a pair of Schroetter tube-forceps down and grasped the coin. He was sorry that he could not have had an X-Ray picture taken so as to show its position.

Dr. QUINLAN related an incident which occurred in St. John's Hospital, where one of the orderlies was eating oyster soup and suddenly choked. He grew black in the face, and was *in extremis*; when the house physician, who happened to be in the hall, took out his pen-knife, stuck it in the alcohol lamp, made a slit in the man's larynx, pushed the oyster out, and thus saved the man's life. It was certainly the most expeditious case of tracheotomy and first aid to the injured of which he knew.

#### **The Results of Partial Inferior Turbinectomies.—By GEORGE B. McAULIFFE, M. D. (Published in full in THE LARYNGOSCOPE, February, 1905, page 97.)**

Dr. HARRIS said that he thought the acceptance of the removal of even a partially deformed turbinate as a rule without restriction would lead to error. Kyle strongly advised the removal of hypertrophy wherever occurring, but not a complete partial turbinectomy in every case. Another method of procedure which he had not practiced but which commended itself to him was the partial removal of the bone after throwing the mucous membrane back. It had been done with excellent results, and would seem to be in keeping with what is being done in septum deformities. He also spoke of another form of turbinectomy which he felt was a mistake, the removal of the anterior portion of the turbinate while leaving the posterior portion. He had recently seen a case treated in this way. The surgeon seemed to think that all the trouble was with the anterior portion,

which he removed, leaving the posterior end. The symptoms continued, and on the removal of the posterior portion the desired relief was obtained.

Dr. PHILLIPS said that he had become a complete convert to the operation of partial inferior turbinectomy in contradistinction to any other method of reducing the diseased tissue, and had practically placed chromic acid and the galvanic cautery among the past methods for reducing the turbinate. He thought it best to make a clean cut in taking off the tissue, and did not like a saw, but preferred a heavy pair of sharp scissors, like those used by Dr. Chevalier Jackson. With these a clean cut could be made just where the blades are placed. He preferred this method for the removal of any part of the turbinal body except, of course, the posterior end. With the clean cut just described, he had been pleased to note that there was little reaction, and little scar tissue. The result was a sufficient amount of turbinal tissue left unhampered either by hypertrophy or scar tissue.

Dr. BERENS thought the operation of considerable value, and called attention to the fact that Dr. Andrew H. Smith many years ago invented an instrument called "Smith's canula scissors," which he used for the removal of the pendulous mucous membrane from the inferior turbinate. Since the advent of adrenalin, Dr. Berens said, it was no longer necessary to sacrifice functioning mucous membrane from the inferior turbinate. By the application of adrenalin, a bloodless dissection of the mucous membrane from the bone could easily be made, a sufficient amount of the bone removed, either with trephine or cutting forceps, and the mucous membrane packed into place. The latter would unite, generally by first intention, and cicatricial contraction would prevent any possible retention of secretion or irritation from one mucous surface rubbing another.

Dr. MYLES said that the questions of the limitations of operations on the turbinate and the kind of operations to be performed were very important. Doubtless most of those present had had their experiences with electricity and different acids without attaining the desired results, and then something positive had been done, part of the tissue as well as part of the edge of the periosteum or edge of the bone had been removed, so that favorable cicatrization was obtained which overcame the tendency to recur again. It was frequently necessary to remove the posterior part of the inferior turbinate as well as part of the edge of the bone. In certain forms of turbinates it was sometimes difficult to remove the exact amount

desired. Complete inferior turbinectomy is a very easy operation, but very seldom commendable. The operation described by Dr. McAuliffe he thought was the one in general favor. The best results and fewest recurrences were obtained where only sufficient was removed to obtain normal free breathing. He thought that his results in progressive aural cases were better than Dr. McAuliffe's, as many of them had improved markedly and no longer suffered from repeated blocking up of the Eustachian tubes.

Dr. McAULIFFE said that he thought in most cases it was the degenerate mucous membrane which should be removed. He did not believe there was any benefit obtained by removing the bone and keeping the diseased membrane. In regard to the effect of the operation on the hearing, he found it practically nil; for, while in some respects it removes tubal hyperæmia, nevertheless in the principle of aural ventilation the increase of the inferior meatus is not beneficial. It was necessary to have a certain amount of expiratory obstruction in order to ventilate the accessory cavities of the head. Inspiration was slower than expiration, and he believed that middle ear ventilation depended more upon expiration than inspiration. The air escaped more readily after inferior turbinectomy than before, so that he thought the operation was of little benefit to the ear. It only slightly retarded the process of sclerosis and did that by the correction of the habits which set up positive hyperæmia in the tube.

#### **The Use of Mucin in Atrophic Conditions of the Nose and Throat.**

Dr. JAMES E. NEWCOMB read a paper with this title. He had been lead to give the remedy a trial from the good results reported from its use by Dr. W. Stuart-Low of London. Mucin, said the author of the paper, belongs to the colloid class of albuminous materials and occurs in the body under two conditions; first, tissue mucin which acts as a cement substance between cells; and second, as an ingredient of all mucous secretions. It is soluble in water and weak alkalies and is probably, in its origin, the result of the differentiation of the protoplasm of certain animal cells. Its primary analysis yields a proteid and a carbo-hydrate called "animal gum." Its function on membranes is to act as a protective and to prevent desiccation. In the stomach and bladder, it may protect the linings of these viscera from the irritation of their acid contents. It is said to have a retarding influence on bacterial growth. It may contribute to the alleged germicidal effect of the ordinary nasal mucus.

Under normal conditions most of the nasal mucus passes backward into the naso-pharynx and is swallowed. When solutions of it are locally applied to the mucosa, they have a soothing influence, soften incrustations and tend to prevent their re-formation. Their hygroscopic action is about one fourth as great as that of glycerine. Combined with an alkali they neutralize the acid reaction often present in atrophic rhinitis. They have undoubtedly an influence in retarding the epithelial metaplasia which is regarded by some as an underlying factor in this affection.

The source of mucin for medicinal use is from the membranes of the calf and pig. It comes in two forms from the English firms which have placed it on the market. One form is a "tabloid" containing five grains each of mucin and bi-carbonate of sodium; the other is a "soloid" containing four and a half grains of each of the substances named with the addition of one grain of mentol. The former is used as a trochee and for internal administration and the soloid for the preparation of solutions. One of these may be dissolved in half an ounce each of sterile water and sterilized lime water. The solution is applied to atrophic membranes either in spray or on cotton carriers. The writer has found it difficult to keep fresh solutions in very hot and damp weather without the addition of a fraction of a grain of thymol to each ounce of fluid.

During the last two years he has given the remedy a thorough trial in atrophic rhinitis and pharyngitis and feels convinced that it is a valuable addition to our resources. It is not a panacea or a specific. Other remedies may answer as well, but this particular remedy has seemed to help along cases which had become stationary. Whatever theory we may hold concerning the pathology of atrophic rhinitis, we all agree that the main problem is first to keep the nose clean and second to stimulate whatever glandular tissue may remain. Both of these ends are attained with mucin.

The amount of the remedy at the disposal of the writer has not been sufficient to allow him to give it internally. Dr. Low, however, makes a strong point of this adjuvant influence in atrophic states of the pharynx and naso-pharynx for in these conditions a deficiency of mucus in the gastric area, a "hypomixia" to use his term, is a prominent feature; and the observations of the last few years have conclusively shown that it is often impossible to put the throat in proper condition without attending to the stomach as well. For this purpose one of the tabloids may be given before and one after each meal.

Finally Dr. Low has shown that the remedy is very serviceable in states of malignancy. The essential lesion of the latter is the

penetration of cells into the tissues. As a result of wasting of the intercellular resisting substance, an avenue is opened for cell penetration. The use of mucin under these conditions supplies the lacking protective and cases have been recorded in which this employment of the remedy has greatly lessened the patients sufferings and in one or two instances there has been a distinct retrogression of the malignant process. It is suggested that in patients already operated on, the mucin may be used to prevent the recurrence of the new growth.

Dr. HARRIS thought that Dr. Newcomb had presented the claims of mucin treatment very clearly. This subject had been under discussion in Great Britain for several years and it was his impression that Dr. Low had been rather severely criticized; and, while he had a few supporters, most of the profession rejected the mucin treatment. An interesting point which had been brought out in the paper was the massage treatment. Dr. Fitzgerald of Hartford had been practicing this method of treatment, and he claims to have cured a number of cases of ozaena as far as abatement of odor and crust formation by merely putting into the hands of the patient a probe or applicator and instructing him how to use it, moistening it with his own saliva. This was done ten or fifteen times a day. Dr. Harris himself had tried this treatment in a few cases and had obtained very satisfactory results.

Dr. FREUDENTHAL said that he thought Dr. Newcomb's paper very interesting indeed. He himself had read Dr. Low's article and had used these tablets, but while they acted well in some instances he did not feel that he could attribute any special benefit to them. He thought, however, that they were valuable in cases of atrophic rhinitis of long standing, which had been treated for years, and where a change of medicine was needed. The speaker said he had his own ideas as to the etiology of atrophic rhinitis, but did not wish to speak of them now. Massage of the nose had been recommended before and worked very well in some cases.

Dr. QUINLAN said in the line of manipulation, he recalled the fact that the Indians of the southwest are in the habit of chewing bits of cactus and putting it in their nostrils, as a remedy for the nose-bleeding produced by the alkali beds in that region.

Dr. NEWCOMB said that in regard to new remedies he believed in the apostolic injunction to "prove all things, hold fast that which is good." It had not been his opinion that the criticism of Dr. Stuart-Low's colleagues had been unduly severe but that their re-

sults had been more of a negative than a positive character. They had tried the remedy but had not attained as good results. He did not think that this remedy was a panacea but he did think it a valuable addition to the list of remedial agents and that it would prove more satisfactory than many others now used. He was much interested in Dr. Harris' statement concerning massage with cotton moistened with saliva, of which he had not previously heard. He thought that no matter what remedy was used, massage was a valuable addition to the treatment.

#### PRESENTATION OF INSTRUMENTS.

##### **Adenoid Forceps.**

Dr. GEORGE B. McAULIFFE presented a pair of Adenoid Forceps which differ from the long accepted style of forceps in that the cutting blades are swivelled on the shanks, and hinged behind, thus protecting uvula and vomer and giving an economy of motion. The cutting edges can be made interchangeable, and there is a spring to regulate the opening of the blades. The instrument was not yet perfected, but it was presented as embodying a new principle.

##### **Probes for the Salivary Ducts.**

Dr. MYLES presented several graduated probes for probing the salivary ducts. He said that some time ago he read a paper which appeared in the December issue of *THE LARYNGOSCOPE*, in which he spoke of probing the salivary ducts, and some skepticism had been expressed on the subject. It was rather easy after one was accustomed to finding the meatus, and he could demonstrate it any time. In one case he had probed and dilated all four of the salivary ducts and given the patient great relief.

Dr. COAKLEY said that he had read Dr. Myles paper about probing the salivary ducts, and that he had tried it in a case and found it of great value. He did not have a small sized probe, but was surprised to find how easily he could insert an ordinary sized probe. In this case, however, the mouth of the duct was rather wide.

Dr. BERENS said that eight or nine years ago he had showed before this section a stone from the sub-maxillary gland, and a little later in the same winter had showed another, much smaller one. They were not difficult to locate with a Hartmann's ear probe, which, by the way, is not unlike those shown here this evening.

Dr. MYLES said that it should be remembered that all diseased ducts were more or less patulous and that under such conditions it

was easier to introduce probes into them than when they were in a healthy state. This set of probes has been made for him by Ford & Co., and had enabled him to treat cases very satisfactorily when he could not do it any other way.

#### **Adenoid Forceps.**

Dr. MEIERHOF presented a pair of small Adenoid Forceps for operating on infants. He generally used an ordinary Beckman curette, but in very young children he preferred to use forceps. Ordinarily he did not believe that one could do a very thorough operation on a child of five or six months, on account of the limited space between the floor of the mouth and the naso-pharyngeal vault. He had these forceps made with a short jaw, which allowed better manipulation for removing the growth. This instrument also has the advantage of being pointed when closed, so that it can be plunged into an abscess and then opened securing a good opening for evacuating the pus.

Dr. QUINLAN said that he would like to ask Dr. Meierhof what was the difference between his adenoid forceps and those used by Dr. Gleitsmann. They seemed to him to bear a very close resemblance.

Dr. MEIERHOF replied that he was not familiar with the instrument referred to, and that he had seen nothing like these presented in any of the instrument stores.

Dr. T. J. HARRIS inquired whether Dr. Meierhof had used the instruments to any great extent, and whether they could be kept in place. He had heard the objection that it might easily slip out of place.

Dr. QUINLAN said that general surgeons would condemn this oral method on account of the danger of reinfection and claim that the only proper method of opening a retro-laryngeal abscess is by a lateral incision through the neck. He wished to say, however, that these cases are not always due to caries of the spinal column but to broken down glands. Often in children of five or six years you find that between the spinal column and the muscles of the retro-pharyngeal space glands that become infected with measles or some other infection and break down leaving large pockets of pus. Cases of spinal caries are different, and should be properly opened by way of the neck.

Dr. MEIERHOF replied that all the cases he had mentioned had been children of six to eighteen months of age, and he found this a safe

and ready means of treating them. The child was held in the proper position, and then the forceps were plunged in and spread out instantly, with the child thrown in a horizontal position face downwards.

Dr. QUINLAN said that in cases of retro-pharyngeal abscesses that he had opened he had the child held on its head, as in doing the operation in the ordinary position there was danger that a deep inspiration would draw the pus into the larynx and cause a mechanical occlusion. With the child inverted, the operation seemed absolutely without danger.

Dr. MEIERHOF said he had the child sit up straight with the mouth open, then put in the forceps and turned the child down on its face and then the forceps were spread out while the child was lying prone. He had never had any accident and good results followed as a rule. Once in a case when there was œdema of the glottis there was trouble, but the child recovered after a tracheotomy.

#### **A Revolving Disc Knife for Submucous Septal Operations.**

Dr. HARMON SMITH presented this instrument and described it as follows: A small instrument I have devised for the purpose of cutting the mucous membrane prior to uplifting the flap has been of material aid in beginning this operation. It consists of a circular disc knife revolving on a small axle, the outer portion of the blade being protected by a jacket and the blade portion being situated at the extremity of a shank, which can be fitted in a handle, permitting its use upon either side of the septum, and still have its outer cutting surface protected by the jacket.

This small circular knife can be passed either below the spur on its ridge border, or above the spur, as is desirable. The conformity of spurs differs so materially that an abstract rule relative as to where to make your initial incision for the flap will not obtain; consequently it must be made wherever the eye of the operator detects a point where the greatest material can be saved for his flap without injury. This location is probably most frequently found to be above the spur, though it would serve a better purpose could we always make our incisions below and remove the mucosa over the entire bony cartilaginous protuberance. With this little knife the operator runs the blade along with gentle pressure sufficient only to cut through the mucous membrane, and continues along the whole length of the spur. If a gentle angle is given the knife, it will cut a beveled incision and uplift slightly the mucous membrane, so that it can be

more easily deflected from the septum by the elevator which comes next into use. The easy manner in which this knife runs over the surface—cutting with equal force at any point and without catching—lends a dexterity to the hand of the operator which is a valuable acquisition in this line of work. The bistoury and scalpel often cut into the cartilage and become somewhat tightly engaged, requiring more force to extricate them, and frequently causing the operator to make a wild cut considerably away from the line of incision he intended to make.

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**The Present Status of the Surgery of the Larynx, Pharynx, Oesophagus and Trachea**—TH. GLUCK—*Monatschr. f. Ohrenh.*, Berlin, March and April, 1904.

The author describes the operation for resection of one or more rings of the trachea, and a plastic operation in which a defect in the trachea is covered by a flap of skin containing bone from the sternum. He also describes his method of performing hemi-laryngectomy and total laryngectomy. Among the latter are a series of cases in which he removed the larynx, pharynx, oesophagus, enlarged cervical glands, portions of the carotid and jugular, and of the pneumogastric, phrenic and sympathetic nerves. In some of these extensive cases plastic operations for the reconstruction of the oesophagus and trachea were successfully carried out, and apparatus for the production of an artificial voice were utilized. The remarkably low mortality in these cases is due, the author claims, to his method of treating the trachea. He brings the trachea out through a skin wound immediately above the notch of the sternum, and sews it to the skin. By this method the danger of aspiration pneumonia is entirely obviated.

This very interesting article should be read in the original.

YANKAUER.

**A Hearing-test Table**—PAUL OSTMANN—*Arch. f. Ohrenh.*, Leipzig, July, 1904.

In this article the author describes a series of tables which he has published, from which the "logarithmic intensity" of the hearing can be found at once, without making the calculations separately for each observation.

YANKAUER.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND  
OTOLOGICAL SOCIETY.

Tenth Annual Meeting, Held in Chicago, Ill., May 30, 31, and June  
1, 1904.

NORVAL H. PIERCE, M.D., President.

(Continued from February No., page 176.)

**"Report of Four Operative Cases of Sinusitis in Children,"  
with a Presentation of Specimens Illustrating the Develop-  
ment of the Sinus.**—BY DR. LEWIS A. COFFIN, New York  
City. (Published in full in THE LARYNGOSCOPE, Vol. XIV.,  
No. 11, page 881.)

DISCUSSION.

Dr. A. LOGAN TURNER said he had listened with a great deal of pleasure to Dr. Coffin's valuable paper, and he congratulated him heartily on the specimens, which were of great value. He envied the opportunity he had of obtaining the material, because such material obtained at that age was all the more valuable.

The author of the paper raised the question of antral abscess in the infant and in young children. Most of the members were doubtless familiar with Dr. Myles' paper on that subject, and also with references in other papers by different authors upon antral suppuration in infants, ranging in age from three to six weeks old. The speaker always had difficulty in understanding how such a thing could be, and he had favored Dr. Coffin's side of the question along with Repke and others, and took issue with Dr. Myles. One had only to look at Dr. Coffin's specimens to see how difficult it was to realize that there could be such a thing as chronic antral abscess in infants and young children. He agreed with Repke that the condition was probably an osteomyelitis of the superior maxilla, but whether it was of tubercular origin or not, was undecided. Some cases were undoubtedly of tubercular origin.

The question of the development of the frontal sinus early in life was also interesting, and he still thought that the differences in the opinions that had been expressed were due to various views which men held on this development. But there was so much variation in the sinuses, both in the adult and infant, that he was not surprised at variations in the time of development.

He was interested in what Dr. Coffin had to say in reference to what he presumed was an old theory. He had seen it mentioned before, namely, the probable development of the sinuses from pneumatic pressure. This was new to him, and it was certainly a view which required thinking over.

With regard to the absence or presence of the frontal sinus, more especially with reference to Lothrop's statistics, he was much impressed with Lothrop's statement in his paper that he very rarely saw any frontal sinus absent. This statement was in opposition to the speaker's own observations. He found eighteen per cent of skulls, even a little more, in which one or both frontal sinuses were absent. The difference in results was due to the way of looking at the matter. He considered the frontal sinus absent if it did not lie above the level of the frontal-nasal suture. Anything which lay more in the orbital or ethmoidal plate, anything which passed above the fronto-nasal suture was frontal sinus, and he thought he was right when he recalled Lothrop's words to the effect that he (Lothrop) considered the frontal sinus present when there was extension into the orbital plate. Inasmuch as there were ethmoidal extensions into the orbital plate, the speaker did not think we had any right to look upon them as frontal sinuses. This was the reason for the difference of opinion.

Dr. WENDELL C. PHILLIPS desired to call the attention of the members to the fact that the preparation of a paper of this kind meant an enormous amount of work. For two or three months Dr. Coffin spent a great deal of time in the preparation of the specimens he had exhibited, and the speaker personally felt that the society was indebted to Dr. Coffin.

Dr. J. A. STUCKY was very much interested in, as well as edified by, the paper, and yet a little surprised. He was surprised that with all the clinical material which New York City furnished, the essayist should have seen or had so few cases. Even in the little city where he hailed from, he had a record of seven cases. He was sure he had had more than that, but he could only find the records of seven cases which he looked up after he received the programme. Four of these required an external operation. There was a fistulous opening, and a diagnosis had been made of dacryocystitis. All that was necessary in these cases was to enlarge the opening through the wound, curette thoroughly, and close it up. In the other three cases the external tissues were not perforated, and the condition was relieved by a free opening through the nose. The ages of these patients varied from two years and five months to eight years. In one case,

eight years of age, the maxillary antrum was involved. All of them had adenoids. He made special mention of that as well as of enlarged tonsils. In addition to the fistulous opening in two cases, he had ectropion without any adhesions.

The essayist mentioned a tubercular history. He did not find that existing in any of the cases he had seen, and all of them made good recoveries.

Dr. ROBT. C. MYLES said the members were indebted to Dr. Coffin for his demonstration. Having worked along these lines for many years, he knew what labor it took to present a subject as well as he had presented it, and there was no doubt but that we were in the dark in regard to these cases. Probably it was better for many of the patients that we were in the dark. Those who were careful observers saw quite frequently infectious diseases invade these sinuses, and they of themselves got well frequently. It was only that class of cases in which there was stenosis, obstruction or confinement of the pyogenic conditions which resulted in necrosis and sloughing of the nose, and it was only in that class of cases that one needed to operate, liberating the gases and pressure therefrom.

In regard to the remarks made by Dr. Stucky, it must be remembered that there was only one of him in Lexington, while there were several hundred specialists in New York, and if they were to compile general statistics, they might come up with him. These cases were occasionally seen in children in which there was necessity for interference. Occasionally patients were seen who suffered from too much surgery as well as from the disease. When free drainage was established, and asepsis thoroughly carried out, very frequently many of the cases recovered in a most miraculous way. He thought the removal of those teeth which were still dormant in the antrum of children was very frequently the cause of the stubborn refusal to get better. He had seen cases of this kind, and thought if the region in which these teeth were buried and growing was let alone, and the surgery was directed above them, we should get much better results.

The question of the frontal sinus and sphenoid was not nearly so important as the one of the antrum and ethmoid.

Dr. Coffin, in closing the discussion, said that Dr. Turner quoted Repke as saying that he seldom saw a case without the frontal sinus. Repke emphatically stated that it might only be present when there was extension into the orbital plate. The speaker said it was altogether a matter of understanding terms, and he thought it was time the profession got together and recognized the nomenclature of this

subject. For instance, not long ago he listened to a paper in which the author spoke of the accessory ethmoidal sinuses. He wondered what was meant by accessory ethmoidal sinuses. When he came to show the specimens, he found it was what Mouret had called ethmoido-lacrimonal cell. It was very well named, and one knew exactly where to look for it. It was very essential for one to arrive at some understanding in talking about these things. If one meant by frontal sinus simply a cavity in the vertical or cancellous portion of the frontal bone, he would be understood. If the doctor meant a cavity in any part of the frontal bone, he was entirely right. In the specimen which the speaker showed there was just the external part of the ethmoid cell. This was all. One could call that the frontal sinus, if he so desired, but it was questionable.

He was interested more particularly in what was said regarding the development of the cells, and it led up to the statement of Dr. Myles that frequently too much surgery was done in many cases, and that many of them got well without treatment. He believed in hammering away at this thing until the general practitioner recognized a condition that could be treated. A great deal could be done for these patients with treatment, and this treatment did not mean surgery.

One of the points he wanted to make especially in his paper was that in infants and children, and up to those shedding the first teeth and permanent teeth, we could not do a satisfactory external operation on the antrum.

**Purulent Otitis Media Complicating Typhoid Fever.—By DR.**

EDWIN W. DAY and DR. CHEVALIER JACKSON, Pittsburg, Pa. (*Published in full in THE LARYNGOSCOPE, Vol. XIV., No. 11, page 887.*)

DISCUSSION.

Dr. EDWARD B. DENCH congratulated the authors on the very exhaustive study which they had made of these cases. What was said regarding the involvement of the perceptive mechanism in these cases was open to question. It was not necessarily due to involvement of the labyrinth. It was due to the involvement of the higher cerebral centers. The authors spoke of the complication occurring in 88 out of 780 cases, which was only a fair proportion of what one might expect in cases of acute infectious disease. One frequently found mixed infection in a great many cases of acute inflammation of the middle ear complicating the acute infectious diseases.

The author's investigation in regard to the primary condition of the mucosa of the tympanum, that is, incising the membrane in the early stages of the disease before it was practically secure in typhoid

fever cases, to determine whether the middle ear contained any pathogenic organisms or not, bore out the assertion of a practitioner who made a series of experiments on this subject and concluded that pathogenic organisms were found in the healthy tympanic cavity. For instance, one would find the staphylococcus, the pneumococcus, the diplococcus, distinct from the pneumococcus sometimes, also the streptococcus in a normal tympanic cavity.

As to the appearance of the canal, in some the fundus was filled up by an epithelial plug, and this plug undergoing disintegration, when examined, was found to contain certain bacteria. This varied in different cases just as an acute purulent otitis may be found occurring as a complication of any acute infectious disease. The appearance of blebs in the external auditory meatus and on the surface of the membrana tympani seemed to be characteristic of a severe form of otitis media and clinically characteristic of typhoid fever.

The development of acute otitis media in the course of typhoid fever depended very much upon the surroundings of the patient, that is, whether the patient was under the best hygienic surrounding or not, and upon the condition of the patient at the time the typhoid infection occurred. This was borne out by the experience the speaker had had in typhoid fever cases. He had found a complicating otitis media rare in typhoid fever. He thought the resisting power of the patient at the end of the second week, or the beginning of the third week, and from that time on was a sufficient reason for the late development of acute otitis media. The otitis was simply favored by the run-down condition of the patient. This was the exciting cause. The dorsal decubitus was an important factor in favoring infection of the tympanic cavity by germs which might be present in the nasopharynx.

Dr. J. A. THOMPSON asked the essayists whether they had under observation in their series of cases a complication that was sometimes confusing in diagnosis, but not when observed accurately and that was, abscess of the parotid gland, which penetrated to and caused apparent suppuration of the ear when the ear itself was not involved.

He had been asked twice in the past year to make mastoid operations on such cases and had been able to demonstrate in both from the origin of the swelling that a large amount of pus came from a suppurating parotid gland. Nothing more was necessary than a careful external incision to avoid the facial nerve. With this in mind, the diagnosis ought to be comparatively easy in these unusual cases.

Dr. J. A. STUCKY stated that 18 months ago he was called to see a case in consultation (typhoid fever case) in which there was a little ear trouble in the second or third week of the disease, which very readily yielded to local treatment. Ten days later the patient went into a delirious condition. He was told about it, and suggested the possibility of mastoid involvement, and perhaps otitic meningitis. This was laughed at. The patient died promptly, and at the post-mortem examination both mastoids were found filled with granulation tissue, the epitympanic wall eroded, the middle ear full of pus, and Eustachian tube patulous. Since then he had held five post-mortem examinations on cases that died of typhoid fever and two of pneumonia. None of the five presented at any time symptoms of ear trouble, yet all showed degeneration of the mastoid cells and antrum, with the middle ear filled with pus. He was beginning to suspect, if any of his patients with typhoid fever had that form of delirium, with head tossing from side to side, involvement of the mastoid of which the general practitioner was not aware. So far as he knew, we had no pathognomonic symptom or symptoms of mastoid involvement. Some of the worst cases of mastoid trouble he had operated on had absolutely no symptoms of mastoid disease, so far as pain, swelling, etc., were concerned. He was informed by Dr. Von Klein, who was present, that in his investigations it was recorded by eminent observers that the bacillus typhosus and pneumococcus were frequently found in the ear when they were not found in the lungs, in the alimentary canal, or anywhere else. Whenever he saw involvement of the lymphatic system in typhoid fever or in pneumonia, he suspected mastoid suppuration as a probable cause.

Dr. CARL E. MUNGER called attention to a case of mastoid involvement in typhoid fever for the purpose of emphasizing the point made by Dr. Dench in regard to the time of occurrence of the complication, which, in his case also, was during the latter part of the disease. It occurred during convalescence. The man was of foreign birth, a Swede, and the conditions in the ward of the general hospital in which this man was were not ideal.

Dr. JAS. F. McKEARNON believed it was just as important to make a frequent aural examination in typhoid fever as in any other of the acute infectious diseases. If these examinations were more frequent, we should have less trouble following that disease from chronic catarrhal affections of the middle ear and of the labyrinth.

So far as the prognosis in these cases of middle ear trouble was concerned (and he meant the chronic type following typhoid fever),

in almost all cases it was bad, as far as recovery of normal hearing was concerned.

He differed from one of the previous speakers and believed that the disturbances were distinctly of the labyrinthine type, and not of the cerebral.

Dr. CHEVALIER JACKSON, in closing the discussion, said there were just a few points he would like to refer to, and one in particular relative to extreme tenderness over the mastoid in the early days of the otitis. In many of these cases, on the first day of the appearance of the discharge, the mastoid would be so tender that patients would not allow one to touch it. Only a few of these cases ultimately developed pus. Sooner or later they all subsided, and whether it was a true periostitis or not, he did not know. When pus formed in these cases there was usually no tenderness. The ordinary mastoid symptoms were often absent, and yet the entire mastoid would be found broken down. There was no tenderness at all in some cases. One case in particular was brought in from a hospital in one of the smaller cities. The patient had typhoid fever, and was sent in as a typhoid case. There was a slight discharge from the ear, and in palpating over the mastoid one could feel that the whole cortex was broken in. One could feel a loose sequestrum composed of cortex. The whole mastoid was broken down, and yet the patient would not acknowledge that it was tender.

In regard to the criticism concerning the bacteriology of these cases, the statement in the paper was that acute purulent otitis media was usually, not invariably, mono-microbial.

In regard to epithelial plugs and blebs being characteristic of typhoid fever otitis, this was not stated. The paper was simply a record of observations. Very many of the cases presented the ordinary picture of acute otitis media.

In regard to parotitis, Dr. Thompson spoke of abscess of the parotid gland bursting into the canal. This did not occur in the cases of the authors, for the reason that these cases were all kept under observation and as soon as parotitis developed, the parotid gland was incised long before there was pus formation. Pus did not form at all, and for that reason they did not get that kind of cases.

As to the diagnosis, one of the speakers stated that it was comparatively easy, and that after the discharge began an immense quantity of secretion poured out. It was bloody serum to begin with, and later became purulent in spite of all they could do to keep the parts aseptic.

Out of eighty-eight cases of purulent otitis media, twenty-five went on to mastoid abscess. In spite of the best care they gave these cases, watching them every day, examining them with mirror and speculum carefully, they could not prevent the development of mastoid abscess.

One of the speakers said that he did not regard the number great; that is, eighty-eight cases of purulent otitis media out of seven hundred and eight cases, which mean that about 11.3% of the cases of typhoid fever developed purulent otitis media. That seemed to them enormous. At the present time it was down to no cases at all, or was at the time they left Pittsburg.

Their research into the etiology was very extensive and interesting, and he regretted the lack of time that prevented its reading, for the discussion and criticism by the eminent gentlemen present would have been interesting and profitable.

**What the Laryngologist May Do for the Correction of Some of the More Common Forms of Defects of Speech.**—By DR. G. HUDSON MAKUEN, Philadelphia. (*Published in full in THE LARYNGOSCOPE, Vol. XIV., No. 9.*)

#### DISCUSSION.

Dr. MAX A. GOLDSTEIN said there was one feature about the paper which he thought might bear further elaboration, one the author touched on but did not develop as much as he did the local manifestations and their remedy, and that was the actual cerebral deficiency or difficulty encountered in speech defects in the stammering and stuttering form. Of course, this touches the question of defective development not only of speech in its central origin, but also of the sight and hearing. In a number of cases with which he had come in contact lately, these features had borne a close relation to one another. He found that in the development of the speech faculty of such a patient, the general education of the child, both as regards defective hearing and defective sight, must be considered and given training.

Dr. HANAU W. LOEB said that the essayist had for some years been endeavoring to bring before the various laryngological associations this subject in such a way that it would be better appreciated, not only from the standpoint of what could be done for these patients, but also from the standpoint of what the laryngologist could do and should do. He had brought before the association in a very succinct way general rules and observations which were to be observed in connection with the attention which these cases required, and he thought really, after all these years of work, it was high time for

the profession to take more interest in the subject and aid him in developing this work, taking it out of the hands of those who were incompetent.

He thought hardly anything could be added to the somewhat elementary consideration of the subject as presented. He did not quite fully agree with the author with reference to respiration. If he understood him correctly, he stated that on account of a lack of proper respiration there was an accumulation of carbonic acid in the blood which interfered with speech production. This would be a difficult thing to prove. It was known that the respiratory center was stimulated by a lack of oxygen. If the respirations were not sufficient to carry off carbonic acid, they were not sufficient to supply the requisite amount of oxygen, and the consequence would be that the respirations would be increased in frequency and the supply of oxygen be less. Unless the author had ample proof, he would be inclined to differ from him in that particular.

Dr. PRICE BROWN was pleased to have heard the paper, because it brought to his mind a case that recently came under his observation. A clergyman, who had been preaching for ten years, had tried his best to improve his vocalization, but often found it impossible to sound the vowels separately. He thought the difficulty would be with the consonants, but these he could sound very well. The clergyman came to him with the idea that possibly some nasal or throat operation might remedy the defect. He examined the throat and found several adenoids. These he removed, not with the expectation that their removal would have any effect in improving his speech. However, very soon after the operation the patient was able to sound his a's and i's distinctly, but had difficulty sometimes in sounding his o's, and would make great effort to do so. However, after due time following the removal of the adenoids, he could sound his vowels as well as his consonants.

Dr. MAKUEN, in closing the discussion, replying to the remarks of Dr. Goldstein, said that he did not go into the psychology of stammering particularly, although he thought the cerebral conditions had more to do with stammering than with some of the other forms of defect of speech. There were some stammerers who did not know they stammered, and if they were not told, they would never know they stammered. There were some forms of defective articulation in which speech was unintelligible and the person did not know that there was anything peculiar about his speech. This was a curious thing. Each one of us had peculiarities of speech. A man with very defective articulation oftentimes did not know that it was de-

fective until his attention was called to it. It satisfied his own ear and his own mind, and that was sufficient. Mental expectancy was often an immediate cause of stammering, and he mentioned hypnosis as a possible means of removing this condition.

The relation of hearing to the various forms of defects of speech was interesting. They were closely related. He had a little child under his care, five years of age, who never spoke at all until about a month ago. The child heard the sounds of music, enjoyed opera and concerts, but did not know the meaning of the sounds of speech. The child could not interpret words. Such a child must be taught the meaning of words just as a baby learned the meaning of words. The child was not deaf except for speech.

With reference to the remarks of Dr. Loeb concerning the effect of carbonic acid upon the circulation of the brain, he would say he mentioned it as one of the possible causes for the aprosexic condition so often found in stammerers. The stammerer often did not think properly, and, therefore, could not speak properly.

(TO BE CONTINUED.)

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#### **Sympathetic Ophthalmia Followed by Loss of Hearing—**

ALBERT BLATSCHECK—*Monatschr. f. Augen.*

Dr. Albert Blatscheck relates the history of a child aged twelve years who suffered the loss of the left eye from an injury with a gun-cap. Sympathetic ophthalmia of the other eye followed. In the course of two months, the right eye was completely destroyed, and enucleation of both bulbi followed. Soon after the enucleation of the injured eye, when the sympathizing eye was at its worst, the hearing became affected. Fever, delirium, and hyperesthesia of the ears followed, and gradually complete deafness ensued. The examination showed deafness of central origin. No other nerves were affected. Dr. M. Sachs, of Vienna, reported a similar case, following double cataract extraction. Deafness came on, but disappeared in four or five weeks. Enucleation of the eye was followed by improvement in the hearing. The author concludes that the neuritis and perineuritis traveled along the optic tracts to the external geniculate bodies, thence to the internal geniculate bodies, and thence to the acoustic nerves.

YANKAUER.

## BOOK REVIEWS.

**Traité Élémentaire et Pratique des Maladies de la Gorge, du Pharynx et du Larynx.** Par le Dr. E. J. MOURE, chargé du Cours de laryngologie, d'otologie et de rhinologie à la Faculté de Médecine de Bordeaux. (Elementary and Practical Treatise of the Diseases of the Throat, Pharynx and Larynx. By Dr. E. J. Moure, Professor of Laryngology, Rhinology and Otology in the Medical Faculty at Bordeaux.) With 202 illustrations including 25 colored plates in the text; one vol. Octavo, 650 pages. Octave Doin, publisher, 8, Place de L'Odéon, Paris. Price, 12 fr.

This volume, which is in some sort a second edition of the author's work on the diseases of the larynx (1890), appears as a complete and thoroughly practical treatise on the diseases of the pharynx and larynx. It is divided into two parts, the first dealing with the pharynx, the second with the larynx. The anatomy of the parts, the pathology of the various diseases, the method of examination, the diagnosis and treatment are all considered. Those matters which are commonly treated in books on general medicine are avoided. The illustrations are well chosen, serving to complete the descriptions of the accompanying text, colored where the color is the point to be illustrated. Throughout, the personality of the author appears prominently. Based, as it is, upon the immense clinical experience of twenty-five years, with the great opportunity for the development of original methods, Dr. Moure's book comes to the profession as an invaluable addition to the literature on the subject.

**Eye, Ear, Nose and Throat Nursing.** By A. EDWARD DAVIS, A.M., M.D., Professor of Diseases of the Eye in the New York Post-graduate Medical School and Hospital, and BEAMAN DOUGLASS, M.D., Professor of Diseases of the Nose and Throat in the New York Post-graduate Medical School and Hospital. 307 pages, with 32 illustrations. F. A. Davis Co., publishers, Philadelphia.

This book is a new departure in the literature of this department of medicine, in that for the first time in the United States, it presents in compact, tangible form the essentials of nursing in Eye, Ear, Nose and Throat cases. Especial attention has been given to methods of preparing solutions, dressings, and remedies, to antisepsis and asepsis, to preparation of patients for operation and to the after nursing. The points of anæsthesia, position of patient, application of remedies, and feeding, peculiar to this branch of surgery are presented and further elucidated by the illustrations.

**Pneumonia and Pneumococcus Infections.** By ROBERT B. PREBLE, A.B., M.D., Professor of Medicine, Northwestern University. Illustrated, 211 pages. Cloyd J. Head & Co., publishers, 40 Dearborn Street, Chicago.

This little volume, dealing with that disease which is rapidly assuming first place among fatal diseases, is most timely. It presents in a concise way the various aspects of pneumonia, discussing quite thoroughly, however, those elements which lend so much uncertainty to the prognosis.

**Die Krankheiten des Kehlkopfes und der Luftröhre.** By Prof. Dr. OTTOKAR CHIARI, of the Royal University of Vienna. With 265 illustrations; 395 pages. Franz Deuticke, publisher, Leipzig and Vienna. Price 10 marks.

To all those who have seen the first two parts of Professor Chiari's masterly work on *Die Krankheiten der Obesen Luftwege*, the appearance of this third concluding part, devoted to the diseases of the larynx and trachea, will be most welcome. The subject is treated in the author's usual thorough and perfectly satisfactory style. The special anatomy of the throat and trachea is presented in the first chapter with 25 illustrations from Toldt's Anatomical Atlas. For the American reader, the use of the universal nomenclature here and throughout the book is to be noted. The chapter on Physiology considers the various functions of the parts, in respiration, in voice production, speaking and singing. The physiology of the central and peripheral nerve supply with the special nervous anatomy occupies the last part of this chapter, giving the special functions of the different nervous elements. The chapters on the methods of examination and general therapy present the subject in a practical way. The major part of the book is devoted to a consideration of the various diseases. The subject matter is complete and the arrangement systematic. The last chapter, on neoplasms, benign and malignant, deserves special mention.

**Methods of Examination and Treatment of Diseases of the Larynx.**

By Dr. THEODOR HERYNG of Warsaw. Octavo vol. 424 pp., including 164 illustrations and four plates. Publisher, Julius Springer, Berlin, 1905. Price, mk. 12. (\$3.00.)

For many years, one of the leading authorities in laryngology, Dr. Theodor Heryng of Warsaw presents perhaps the most exhaustive treatise on therapy of the larynx that has as yet been published. The large practical experience of this writer, the prominent part which he has taken during the last decade in the development of the most effective treatment of laryngeal tuberculosis and his well known skill in laryngeal technique qualify him most especially to present such a work.

In the consideration of the therapy of the larynx this volume contains almost exclusively the original opinions and methods of the author. There is an element of practicability, good logic and sound sense pervading its pages. The work is up to date in all its essentials and includes the most recent consideration of inhalation, vaporization, local anesthesia and a complete pharmacology. Our literature welcomes such a valuable contribution teeming with original and well-proven suggestions of technique and treatment.

M. A. G.

